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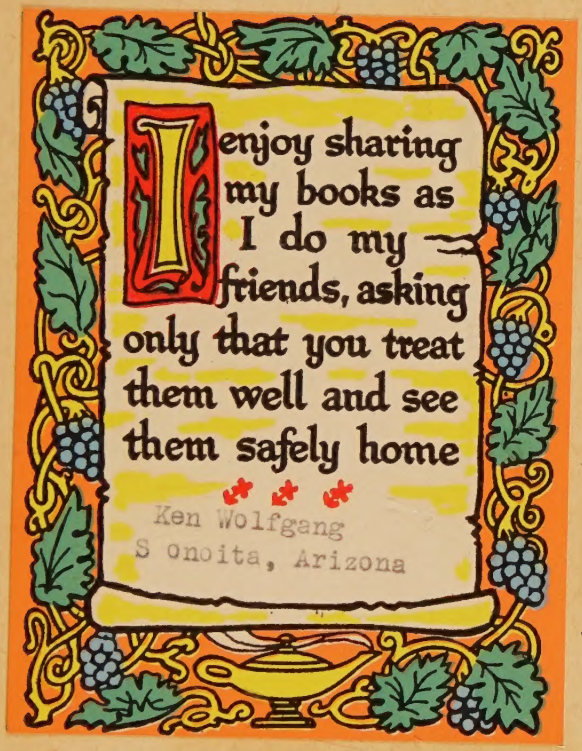
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THE GRAND CANYON OF THE COLORADO

RECURRENT STUDIES IN IMPRESSIONS AND APPEARANCES

BY

JOHN C. VAN DYKE

AUTHOR OF "THE DESERT," "THE OPAL SEA," "THE MOUNTAIN," ETC.

WITH ILLUSTRATIONS FROM PHOTOGRAPHS

NEW YORK

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PREFACE–DEDICATION

TO

MARIE EDGAR

Up from the sea, from the fogs and mists of the Atlantic, the flat basin of the Mississippi, the plains of Kansas, and the low divides of eastern Colorado! Up to the great stretches of the Plateau Country where the sky is unending, the light unfailing, and the clean air still blows over an unbroken wilderness!

Up from the gasolene and dust of the city, the screech of motor and engine, the bustle and roar of human endeavor, the shuffle of feet, the chatter of life! Up to the glow of the Painted Desert, the shadow of the Tusayan Forest, the color of the Grand Canyon—the open spaces where Nature still rules supreme and man is merely a fretful midge quite unable to disturb her majestic repose.

Up, too, if only for a breathing spell, from the aftermath of the war, with its clash of counsel, its play for advantage, its refinement of futility. The Eastern skies are not yet clear. Though the smoke of battle has lifted, the din of discord still is there and hatred dwelleth in Babylon. But here in the

glowing West Nature speeds her methods with quiet unconcern. She is not shaken by the whirlwind. The sweet influences of her Pleiades are not bound, nor the bands of Orion loosened, nor the morning stars stilled from singing together. Oh! the great sanity of her poise, the calmness of her mood, the serenity of her visage splendid!

Was there ever a time in human history when a return to Nature was so much needed as just now? How shall the nations be rebuilded, the lost faith and hope renewed, the race live again save through the Great Mother whom we have forsaken? She lays the warp and binds the woof and speeds the splendor of the world, let man do what he may to mar her work. How shall we live without her?

Need I then apologize for calling your attention to her forms and faces, her lights and colors, her methods of building and stages of development here at the Grand Canyon? She never stops from labor; the Canyon is still in process of building; here you may see the Mother of Marvels at her work. How calmly and easily she toils! This chasm of the earth has been called a wonder, and rightly enough, but does not some of the wonder of it lie in the serene patience that has gone to its making?

Running water, the smooth-edged winds, and the silent frost have been the only tools used here, but through the slow years that have gone by and

ceased to be the Great Gorge has been wrought in form stupendous. A whole mountain range has been, not heaved up from the plateau, but cut out of it—cut in intaglio. The hardness of the materials with the softness of the tools but emphasize the wonder of the work. A sermon in patience lies in the stone if we shall read it aright.

But there is also a song. For this plateau intaglio has been cut with lines of flowing grandeur, rounded with perfect contours, cast in an arabesque of colossal rhythm. The full delirium of song, however, lies in its spread of color. You shall not look upon its like again, for the world elsewhere does not show it. The gray-green surface of the earth has been broken through here and the rose and gold of the underlying strata are revealed. The high face-walls stand

"Mocking the air with colors idly spread"

and the air itself responds with veilings of lilac and purple. The gamut of color at the Canyon seems to have no beginning, no ending. The song outsoars the sermon.

Again need I apologize for attempting to point out this majestic beauty? It has lain here unheeded for so many centuries while the generations have gone to the shades worn out with their own vanities. Will they never turn again to the beauty of the

world? Though we call in vain, still let us call. If only one should heed and know a new joy in this Canyon splendor, would that not be worth the effort?

JOHN C. VAN DYKE.

DESERT VIEW, 1919.

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THE GRAND CANYON OF THE COLORADO

THE GRAND CANYON

CHAPTER I

THE RIM

THE unexpected happens at the Canyon. Surprise, wonder, amazement are looked for, but one hardly counts upon fear. In common with the average visitor, upon arrival you hurry up the steps from the station, pass along the front of the hotel, and go out at once to the Rim for a first view. You are impatient of delay in seeing this marvel of the world. Almost before you know it you are at the edge. The great abyss, without hint or warning, opens before your feet. For the moment the earth seems cleft in twain and you are left standing at the brink. As you pause there momentarily the rock platforms down below seem to heave, the buttes sway; even the opposite Rim of the Canyon undulates slightly. The depth yawns to engulf you. Instinctively you shrink back. If it were not for the presence of companions you might cry out.

Ah! the terror of it!

And, worse than that, the mad attraction of it,

the dread temptation that lies within it! The chasm repels and yet draws. What does it mean? Why before this most prodigious beauty of the world does one feel tempted to leap over the edge?

It is true you do not, but your heart pounds uncomfortably and perhaps you grow a little whey-faced. For a moment you doubt your sanity and question if you are not on the knife-blade edge between the rational and the irrational. You hold tightly to a tree or the back of a bench and try to appear indifferent. But the mere suggestion is disturbing. Why should one think such mad thoughts here at the Canyon?

After a few minutes perhaps you draw a step nearer and take a more cautious peep into the depth. A cliff-swallow cuts by your head with a quick flirt of wing and goes out over the edge. You watch him with a strange, apprehensive feeling. He will almost surely fall or be drawn down into that gulf. But no. He speeds on serenely, chases his fellows down into the depth, comes up again into the blue like a shaft shot from a bow. He is at home here, over or under the walls. He knows no fear or lure or temptation.

An Indian dog from the Hopi house near at hand trots along the edge looking for his master. Apparently he cares nothing about the precipice beside him. Instinctively he places his feet just

right, whether travelling along the rocky Rim or along a trail in the forest. If one should take him by the collar and try to drag him or push him over the edge, a struggle and a fight would develop at once. He knows the cliff and has no notion of going over it either voluntarily or involuntarily. But he has no fear of it.

Presently you discover the dog's master out on a point of projecting rock—out on a pinnacle that seems almost as though it were tottering. He is wigwagging with a white flag to some party across the Canyon on the North Rim, ten miles or more away. He stands on the very verge of the pinnacle. A single misstep, a momentary dizziness, and he is over. But he stands perfectly still; he does not reel. He, too, is at home here at the Rim. He has no feeling of fear and not the slightest thought about suicide or insanity.

None of the Children of the Sun understand such a thing as attraction by repulsion. To fear the abyss and yet be possessed by a mad desire to plunge within it does not come into their heads. Nor do they know that subtler charm that draws stronger than dread—the delight of swaying out and down through that blue-violet air, swaying into eternity without a pause or interruption and with not a particle of doubt about the instant attainment of Nirvana! Did not the followers of the

Emir Musa cast themselves down from the high walls of the City of Brass, crying to the houris below: "By Allah! Thou art fair"? Death does not always appear as a fleshless skull. It sometimes comes disguised as beauty and with the lure of the siren.

But does not that way lie madness? Is it the fear of the gulf so much as the fear of self—the fear that you may yield to an irrational impulse? You shrink back from the thought even more than from the fact and cling to your sanity with a more nervous grip than you have upon the back of the bench. Then gradually you return somewhat to yourself. The terror of the abyss is not in the Canyon but in your over-sensitive nerves. Civilization has keyed you up to the snapping-point, and here in the presence of a great sensation you feel the strain.

There is company for your misery just here, for almost every one at the Canyon for the first time knows this impulse. After a few days a normal poise is regained and perhaps you forget yourself in the greatness of your surroundings. Nature is always making repairs on the human as upon her other creations. She helps him back to sanity and sound nerves as soon as he leaves the house for the open. Still, even after you have arrived at self-composure you have an uneasy feeling about others.

You cannot bear to see any one standing too close to the edge. You look the other way. And any one doing stunts from a point of overhanging rock makes you angry. And rightly enough. The most expert climbers here at the Canyon crawl along ledges on their hands and knees where, if it were not for that sheer descent, they would walk upright and steadily. One takes precautions. Eventually he becomes like the swallow and the Indian—that is, fearless but not foolish.

The Canyon is perhaps what might be called a natural rather than an artificial hazard. There is a difference. It is not probable that the city dweller (or for that matter the dog or the Indian) will ever conquer a disagreeable feeling in looking over the edge of a thirty-story sky-scraper into a canyon street. That may be because there is possibly some madness in both the building and the street that spurs on his own incipient mania. But there is no madness in Nature and no terror in her precipices once we have the fumes of civilization out of our brain and have returned to the normal life.

That is not to say that Nature at the Canyon or elsewhere does not occasionally indulge in extravagances. The view from El Tovar (Plates 1, 2, 3) is, at the very start, anything but normal. The English visitor gasps over it and perhaps takes the next train out. Landscape to him means much foliage,

a sunlit lawn, flat water for reflection, distant hills, some bowling white clouds against a blue sky. That is usually considered a livable landscape. And so it is. But there is nothing livable, nothing intimate about the Canyon. It is not a park or countryside scene, but a spectacle, a panorama—Nature in her most dramatic mood using her pageant properties with a prodigality of splendor almost unthinkable. It is a tremendous show, and to carry it off effects are employed that may be thought little short of theatrical. To illustrate:

The rock forms are florid, fantastic, flamboyant, and yet planned on so vast a scale that they are impressive and commanding through sheer mass. The colors are hectic, sky-flushed, fire-fused, perhaps leached and bleached by rain or flung off in vivid tones by blazing sunlight. Sometimes a vermilion-red glows beside a fire-green, while at other times, so subtle is the blend that you cannot draw a line between gold and orange or purple and mauve. The lights shift almost like the footlights in a ballet, showing a silver, a saffron, a pink, a heliotrope. The mornings are perhaps all blue and gold; the evenings all rose and violet. As for the atmospheres, the Canyon depths will reveal aerial blues at almost any time, but at dawn and sunset the envelope may thicken to a haze of pale gold or lilac or purple, and with dusk it sinks into a strange night blue.

From a photograph, copyrighted by Fred Harvey.

PLATE 1. THE BATTLESHIP FROM EL TOVAR.

Maricopa Point left, Dana Butte middle shadow, arenas in Red Wall in sunlight, Battleship right foreground.

The Colorado! Why, yes; this is the valley it has cut, and the River itself is down there, but you cannot see it! When later, from some projecting point, you gain a first glimpse of it there is some disappointment. It looks like a thread of golden metal inlaid at the bottom of a purple bed. Its surface appears smooth, but if you continue to look at it steadfastly you will notice tiny moving flecks of light upon it. These flecks and quivers are the foam-crests of waves. And as the wind shifts and eddies in toward you there comes up a faint and far roar—a sinking and rising roar. The swift-rushing river is dashing and flashing its way to the sea, but it is so far off that you grasp neither its form nor its fury.

In addition to these Canyon peculiarities the varying meteorological appearances are startling. The sunrises and the sunsets, especially in summer, are preternatural in their brilliancy and almost raving in their color splendor. Frequently on hot afternoons dark clouds drift across the Canyon, letting down great fringed sheets of rain that melt into silvery mists. Blue-violet lightning flashes down into the depth and runs in rivulets among the buttes. Rainbows not only arch the passing showers from Rim to Rim, but the spectrum hues sometimes appear at noonday, straight overhead in the ice-clouds of the feathery cirrus, with no rain what-

ever falling and with no arching bow. The scene is sometimes varied still further by clouds that form within the Canyon and slowly rise toward the Rim, breaking and dissipating as they rise, or by fogs that bank the Canyon full to the lip; and far down to the east, where the river turns coming out of the Marble Canyon, is the Painted Desert, and out of that at sunset occasionally come clouds of sand, purple-hued, lightning-riven, reaching up to the clouds of heaven, marching with a roaring wind across the desert, across the Little Colorado, and spilling down into the Canyon from the height of Comanche Point.

The unusual and the spectacular are everywhere, for, all told, the Canyon is Nature's most colossal piece of stage-setting. The Great Goddess has here put carmines on her cheeks, jewels at her throat, and robed herself in her most astounding livery. Day after day she stands in the great spot-light of the sun, revealing her majestic beauty and her incomparable splendor. Around her are golden and garnet hued walls, below her are purple depths, above her is the azure immensity. A rose-and-lilac atmosphere makes of them all a wondrous harmony. Serene she stands, as young, as radiant, and as beautiful as at the earliest day. Never for a moment does she lose her serenity. For all her gay display her repose is not ruffled. In the final

From a photograph copyrighted by Fred Harvey.

PLATE 2. BRIGHT ANGEL FROM EL TOVAR.

Battleship in shadow. Bright Angel Trail below. Turtlehead right middle distance, North Rim on horizon.

analysis that repose is, here as elsewhere, her most dominant and impressive quality.

Naturally, after so much that is amazing and some that is harrowing, one at first is more or less bewildered. You cannot step out of the monotony of a railway-car and, walking a few steps, enter upon something that is the last word in grandeur and sublimity without catching your breath and gasping a bit. Some people stand and stare with their mouths ajar, some whistle or talk unconsciously to themselves, some sit down and softly swear. But all are bewildered. They cannot grasp it. Nature seems out of joint. The walls are all precipices, the buttes are all carved and isolated peaks, the colors are madly mixed, and as for that weird River, it is so deep-sunk in fire-rock that it cannot be seen, and, though it never ceases from roaring, it cannot be heard. Destruction, desolation, and silence are on every hand.

And so, bewildered and dazzled, you go in to breakfast.

But give yourself a little time and you will gain a different point of view. The scene will apparently readjust itself. You will understand that it is abnormal, dramatic, spectacular, and judge it accordingly. Then you will see that everything at the Canyon, and in this Great Plateau country out of which it is carved, is all of a piece and goes

together quite perfectly. It is a different geological surface and period from what you have been accustomed to, but it is thoroughly harmonious within itself. Eventually you will see that the great cleft valley has majesty, the buttes and walls dignity, the strata waving grace, the colors both charm and sublimity. The Canyon comes together after its kind, making a harmonious, self-sustaining picture, ideally panoramic, and all the more impressive for its size, its brilliancy of light, and its burning color splendor.

CHAPTER II

MAGNITUDE AND SCALE

At first we cannot see things here at the Canyon for their vastness. The mind keeps groping for a scale of proportion—something whereby we can mentally measure. Standards of comparison break down and common experience helps us not at all. The size of Crater Lake in Oregon or Mt. Shasta in California is gathered somewhat from walking around it, but the more one walks about the Canyon the vaster it becomes. Distance seems boundless.

The two-foot rule has to be abandoned, and even the scale of miles seems to serve us but indifferently. We are told that the Canyon is a mile deep, that it is twelve or more miles across, that it is two hundred and twenty miles from the Marble Canyon to the Grand Wash; but how much does that mean to us? By the same token, Spencer Terrace and Fiske Butte make up a mere two-mile promontory that reaches out from the foot of Mt. Huethawali toward the River; but those two miles lead over a flat stone floor, hard as iron, and with the indication of many thousand feet of similar

solid rock beneath it. The distance in miles means nothing, but the tread upon that bare rock, the feel of the foot, brings home an unforgettable impression of the solidity and substance of the earth's surface. No; figures do not help us. A painter who could not do a sum in vulgar fractions would comprehend the Canyon more readily than a mathematician.

We go back to comparisons with other scenes of huge proportions. We multiply the Yellowstone or the Yosemite and countersink the Himalayas, seeking a resemblance to the Great Gorge, but the imagination does not respond. The abrupt end of the Muir Glacier in Alaska offers faint suggestion of sheer descent, and the wall of the Catskills facing the Hudson indicates what the Canyon may become thousands of years hence; but the likenesses are strained and feeble. There are cliff walls in the Rockies more rugged than these, more gray and forbidding in color, more massive in sheer power; but again they evoke no imagery, sustain no analogy. The wonders of the world are brought forth in vain. There is no similarity. The Canyon is unique—in a category by itself.

Then spring up the grotesqueries of the multitude. Some one talks about the Washington Monument and how small it would look among these buttes; another puts a Brooklyn Bridge

across the Inner Gorge; and perhaps a third arrives at a scale of size by throwing Niagara into the Canyon and then feigning to look for it with an opera-glass. But again the mind does not rise to these exaggerated parallels. In fact it is rather deadened by them, as by the thousands of years it would take that railway-train to reach the nearest fixed star. It arrives at things in a more elementary way and is finally impressed by commoner facts, such, for instance, as the sage-brush on the Battleship (Plate 1) below you not being sage-brush but trees (pinyons) fifteen feet high, or the great length of time it takes an eagle to cross a side-canyon and finally swing up and alight on a pinnacle of rock.

Next in order is the architectural parallel—something that seems to meet with favorable reception in almost every quarter. It is usually associated with mythological allusion, and out of the two is squeezed a pseudo-poetry, a hybrid romance. It seems that years ago, when this country was young and defenseless, some people more or less in authority broke in on the Canyon and exhausted the pantheon of gods in giving names to the buttes and promontories; and now every one who talks or writes about the Canyon from necessity uses architectural term and mythological name to point his meaning. The result is that these enormous Canyon forms are dwarfed to the building plan of a

Buddhist temple and the great goddess Nature is put out of countenance by the blinking little divinities of India and Egypt.

The inadequacy, not to say absurdity, of such a parallel becomes apparent when it is realized that some of these buttes stand five thousand feet from base to summit and that no "temple," past or present, measures up one-tenth of that height. The association does not enlarge but rather belittles the Canyon. For when one writes

"The robin's breast
Was colored like the sunset west"

the comparison appeals to the imagination and makes of the robin's breast something wonderfully brilliant. But if one puts it the other way around and writes

"The sunset west
Was colored like the robin's breast"

the comparison of the greater to the less makes a very small and weak affair of the sunset west. Just so here in this stupendous slash in the earth's crust. The buttes and isolated points that have been looming heavenward in majestic isolation for thousands of years before the coming of the Pale Face, are not made more grand or comprehensible by likening them by name to the squat temples of Buddha or Shiva or Zoroaster.

From a photograph, copyrighted by Fred Harvey.

PLATE 3. BUTTES FROM EL TOVAR.

Battleship in shadow, Granite Gorge central, Shiva at left, Isis middle distance, Cheops right.

And where, by the way, are the temples of Zoroaster? And what eye has seen a "tower" of Set or of Ra? There were pylons in Egyptian architecture but no towers, and the Fire-Worshippers may have had temples, but to-day the place thereof knows them no more. And in any event what have these dead-and-gone gods, what have such operatic divinities as Wotan and Brunhilde to do with this Western wonder? The "temples" of the gods and beside them the "castles" of Guinevere and the Queen of Sheba! What a lugging in by the ears of questionable characters!

Why, if it were necessary to put a brand on the Canyon walls and buttes, were they not named for the Indians, as "Coconino Plateau" or "Pima Point," or after the Spaniards, as "Tovar Butte," or with just plain descriptive titles, such as "Grand View" or "Cedar Mountain"? But evidently the parlor-car poet was abroad in the land and in consequence the mock-heroic and the absurd have been put upon the map. A series of numbers would have been less agonizing and quite as poetic.

Poetry and the Canyon! How very far removed they are from one another! In the Harz Mountains or along the Rhine the legend clings about every rock and pool and river, and seems very fitting, quite in keeping with the gentle face that Nature there displays. But what legend is there

about the Canyon, barring the devil lore of the Indians, that has ever obtained? If you suppose it known and settled by humanity for a thousand years, you still cannot imagine it a place for fairies or poets or lovers. What impression could a Venus, a Lorelei, or an Isolde make here? In this great depth they would appear as the mere butterflies of minstrelsy.

Should one, however, go back and conjure up the enormous Genii of the Arabian Nights new possibilities would immediately arise. Such gigantic forms and fantastic characters would be appropriate to the Canyon. You can imagine the Genie pent up in the Bottle, dragged ashore from the rushing waters of the Colorado, and when freed from the Bottle expanding in an enormous cloud-like form that would fill not only the Inner Gorge but the whole Canyon. With such a creation you find the spectacular meeting the spectacular. Both the Canyon and the Genie are abnormal, colossal, stupendous; they complement each other in scale and go together quite perfectly.

But mere man, whether romantic or otherwise, is no more here than a fly on St. Peter's dome—something too infinitesimal to be reckoned with. He is not to the Canyon born and has less footing in it than the coyote whelped in the wind-worn pockets under the Rim or the jack-rabbit that is

bred on its lower terraces. And we, if we would understand the Canyon, must largely eliminate the human element of it. It is insignificant. We can get on without it.

With no adequate scale of proportion for form, we are perhaps even worse off when it comes to color. For the spread of it here outruns all our experience. The cleft of the Yellowstone is a colored ditch in the forest and the Garden of the Gods a front-lawn display compared with it. The Canyon has all their variety and many times their quality. At sunset, with the western sky aflame, the whole violet arch of the upper space seems to fling down its brilliancy on this Plateau Country, turning forest, desert, and Canyon into a wide ring of splendor. From butte to butte, from Point Sublime to Cape Final, the great depth glows as though inlaid with patines of precious metal and studded with half-hidden jewels. The Coconino walls turn golden, the Red walls are salmon-hued, the Tonto platforms Nile-green, the Unkar beds vermilion-red, the Inner Canyon heliotrope-purple.

These hues run along cliff and butte and point and platform in unending sequence. There seems no limit to their volume. Over on the Painted Desert (Plate 33) and along the Rim of the Marble Canyon the sun-shafts and the sky reflection repeat the tale in tones of opal and iridescent fire.

Even the San Francisco Mountains, far away to the southeast, respond with an alpen glow from their snowy summits. There never was such another story of color.

To compare this display to the sea at sunset is not to gain in size, for the horizon ring there is not so great as here; and it is not to gain in color, since the local hue of the sea is blue-green and the Canyon in its rock strata has a thousand local hues to rival it. The sea does not help us to comprehension, and, as a matter of fact, no one ever thinks of it at the Canyon. Nor do we gain any greater understanding by calling the depth "a blue abyss" or "a color dream." The phrases merely point to our helplessness in expression. We can do little more than stare at it and wonder.

The wonder is that with this immense gamut of tones there is no false note, no discord. How does it happen? Every stratum in the Canyon has a distinct local note and brings in a separate tale with the blare of a thousand bugles blown. Waves of scarlet and gold seem set in motion by the rising and the setting sun, the light-shot clouds overhead fling down reflections of topaz and amethyst, the cobalt sky and the blue-green forest are the reverberating backgrounds. How does it happen that these great areas of apparently opposed hues come together and fuse in a perfect harmony?

Is it, perhaps, the atmosphere that strains the notes and causes the blend? That atmosphere is colored, too, and within an hour's time may pass from saffron to rose, or from violet to purple. As the air changes, the hues of the walls and buttes change to correspond. Dramatic and even theatrical as is this display, it is always in such perfect harmony and upon such a huge scale that the senses become more or less intoxicated and people grow ecstatic. They exclaim, or tears come to their eyes, or they choke up with emotion—sufficient proof, perhaps, of the fact that they are in the presence of stupendous beauty.

Form and color are not the only immensities that one meets at the Canyon. You are up from the sea seven thousand feet, but the sky is no nearer to you. Look at it a moment and how very deep it seems. You may know its depth by the quality of the blue. It is much darker than down at sea-level, and is, in fact, faintly tinged with violet. How the arch seems to lift into infinite space! Have you ever seen so high a sky? And how low down the horizon rim! Standing on the point of Grand View it swings around you in a perfect circle. You are the centre of the circle and on a level with its lowermost edge. From this point you can easily see Navaho Mountain a hundred miles away to the northeast over the Painted Desert. That is

only one-half the circle. Looking down to the southwest you can see, on the edge of the horizon, mountain ranges that are another hundred miles away. That is the other half of the circle. One keeps on insisting that everything at the Canyon is on a scale quite outside of normal experience.

And yet with all this colossal scale the forms and colors are rightly proportioned each in itself and in relation to the others. At first you may be absorbed by the great depth of the Canyon. You keep gazing down into the abyss and marvelling over the tremendous trench that Nature has dug. But the depth of the trench is exactly right in relation to its width and length. If you narrowed its breadth, you would feel a lack of proper balance. The proportions of the Inner Gorge to the Tonto platforms and the platforms to the upper walls would be lost; the Canyon would appear as a mere crack in the earth's crust. Just so with the colors. The warm colors—the reds, golds, and yellows—seem to predominate, but they are rightly tempered and harmonized by the cool colors—the greens and blues. Once more there is unity of effect.

And, finally, the combination of all these constituent parts—form, color, air, and sky—is again quite perfect. Each element, vast in itself, goes out and meets the other elements and blends with them into a complete whole. The great size

From a photograph by A. J. Baker, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 4. CATHEDRAL STAIRS, HERMIT TRAIL.

Pima Point right, Cope Butte left foreground, Granite Gorge central, seen across ragged cut, buttes in distance.

and the great blend give us what we call the sublime.

Well, it might be thought that out of these huge elements would come a hum, a hymn,

"The stretched metre of an antique song"

that was once sacred to Orpheus. But no. A silence reigns everywhere. The sun comes up over the Painted Desert through a haze of spectrum colors but there is no sound, and it goes down over the Uinkaret Mountains in all the glory of crimson and purple, but the silence is not broken. In the early morning you may hear at certain places the respiration of the River, or the sough of the pinyons along the Rim, or the jangle of the jays in the pines, but they are only momentary happenings. There may be flying shadows of clouds moving across the Canyon, or misty rain falling into its depths (Plate 27), but these are silent things that creep in and out with an imperceptible footfall. The huge taluses under the upright walls indicate that blocks of limestone and sandstone are continually falling—being pried off the face of the walls by frost and heat. They keep gathering upon the slopes below, but you seldom, if ever, see them fall, and quite as seldom hear them. In the Alps one wakens in the summer nights with the slide and roar of avalanches, but at the Canyon one feels no shock,

is conscious of no sound. The stillness seems like that of stellar space.

And out of the silence perhaps one gathers the feeling of repose. It is in contrast with a feeling that there is more or less of chaos and destruction going on here. Nature at the Canyon is tearing down rather than building up. But in her economy death is just as much a part of the Plan as life. For her own purposes she broods and rears and elevates, and equally for her own purposes she levels, she sweeps away, she destroys. Neither working of the Plan disturbs her poise or ruffles her composure for a moment. Everything is done with calmness. A day or a thousand years—what matters it to her! In the fulness of time everything comes to pass as appointed. Therefore is there peace, and with it repose and silence—the silence that suggests eternity.

What a land of mystery! It is still, hushed, practically dead. The violet-purple air hangs over it like a royal pall, the white sun cuts it out in strange lights and shades as it does the surface of the dead moon, the flushed colors that go with decay and disintegration are everywhere. Yet here the Great Goddess presides, standing beside the grave as beside the cradle. And we can only wonder, because we do not entirely understand—because the mind cannot rise to so vast a conception. Long associa-

tion with this Plateau Country may better comprehension:

> "The mind
> Expanded by the genius of the spot
> May grow colossal."

But there will always be a wonder.

CHAPTER III

CANYON CARVING

THE great size of the Canyon has given rise to many odd theories regarding its origin. It is difficult to convince people that anything so huge could result from ordinary causes. They insist that the extraordinary, the accidental, the cataclysmic have been at work here. And, of course, spirits of the earth and air have played their part. The supernatural is usually invoked when the natural is uncomprehended.

Very likely when Cardenas and his company of men came across the deserts and paused abruptly here on the Canyon's edge, they thought it the end of the earth, or at least a volcanic chasm that rent the earth in twain. It was just the kind of place to harbor a Satanic contingent, and probably the Spanish imagination peopled it with demons. And to-day there are some spooky beliefs entertained about it. The hotel guides shake their heads and talk about suction winds that draw down into the depths; of eagles and buzzards that never fly across the River, though they swing around under the walls; of Phantom Creek and Haunted Canyon

across from El Tovar; of caves that moan and ghosts that groan, and lights that flicker at night. There is a bagful of queer stories for those that like them.

The aboriginal tale usually heard relates that a great chief who was inconsolable over the loss of his wife was taken to see her in the Happy Hunting-Grounds by the god Tah-vwoats. The trail thither was down the Canyon of the Colorado—made by the god for the purpose. He afterward brought the chief back to earth, and fearful lest others might travel the same Canyon trail, he turned a roaring river into it to make the way impassable. When Powell came down the Canyon in 1869 the Indians still believed the tale—believed that the River disappeared in the earth and that no boat could pass the rapids and whirlpools set in motion by Tah-vwoats.

There is a white man's tale, attributed to Joaquin Miller, that seems to run on all fours with the Indian legend, and was probably taken from it. It is in substance that the Colorado once flowed underground, perhaps for many centuries; that it was a lost river and, after disappearing, never rose again to the light of day; that canoes going down it never returned, but were dashed to pieces over subterranean waterfalls, the musical sounds of which were occasionally heard through the rock strata. Miller

was perhaps not responsible for more than the theory that the River had run underground for an indefinite period and that finally the rock-roof had fallen in and exposed the Canyon. The fancy lends itself to poetry, but there never was any necessity for it as explanation.

Still another theory is put forth that suggests the great trench was originally an enormous crack formed by an earthquake, or by contraction of the cooled earth-crust, or by subsidence; and that the River, taking the line of least resistance, followed the crack and deepened its bed to the present proportions. But if the great trench had been produced by subsidence or volcanic action, the sedimentary layers of rock in the walls would have been dislocated and twisted where they now lie even and match each other perfectly across arenas and across the Canyon itself. The walls and buttes and canyons would have been different one from another in form; and volcanic rock, perhaps cinder cones, craters, and lava streams would have been apparent. No; neither subsidence nor contraction nor volcanism offers a way out.

Nor does the theory of one of the Canyon's oldest inhabitants,* that the River basin was the result of

* Mr. W. W. Bass, who has been "the guide, philosopher, and friend" of almost every geologist at the Canyon. Unquestionably he knows the geology of the region.

an anticlinal fold of the rock strata, that the break occurred at the point of the sharpest fold, and that the River eventually widened the break, help us much. Again, some large indication of the fold would be apparent in the existing strata if such a thrust had ever taken place over a wide area. The theory is more or less scientific, but neither the fold nor the theory seems to hold water.

None of these explanations is so acceptable to the laity as the one that supposes the whole width of the Canyon to have been filled at one time with a rushing river—a river a dozen miles wide and a mile deep. The most mentally dense can comprehend that the great Canyon could be carved out by water, provided there was enough of it. And, of course, nothing but a deluge could do the carving here shown.

But there is no more basis, in fact, to the wide-river theory than to the Indian legend. A river twelve miles across would argue greater rainfall than ever came to earth in geological times. Had there been such a rainfall, all the river-valleys of North America would show enormous widths; and the Colorado to furnish forth that flood would require tributaries many times greater than now appear. The immense body of water could never have flowed through the narrower canyons lying to the northeast, such as the Marble or the Glen Can-

yon. Moreover, so vast a river would run swifter and cut deeper in the narrow places than in the wide places; the Marble Canyon would have turned into a mighty cataract and the Grand Canyon into an expanded lake. But there is no evidence that such a condition ever existed. Again, the theory is not necessary to an understanding.

The Colorado in all probability was never much wider or deeper than it now appears—that is, two, three, or four hundred feet across and with a depth of from perhaps ten to fifty feet (Plate 14). It never cut more than its own width. At no time in its history did its sand-hued waters wash the bases of the present Red Wall or creep up to the foot of the El Tovar cliffs whence you are looking down. It was always at the bottom of an inner canyon hewn by its own cutting, just as to-day (Plate 5). The rip-saw gash in the rock was made by the River itself and not by an earthquake or an anticlinal fold. The cutting power of the River is here extraordinary, and yet easily explained by the inclination of its bed and the volume of its stream.

A river in its course to the sea carries with it various substances and materials. The floating pumice, wood, or other débris carried on the surface has little effect upon the river's bed or banks and may be dismissed from present consideration. The silts and sediments carried in the water, in

solution and otherwise, have a decided grinding and wearing power, and, with great velocity, they in time cut out formidable circles, pockets, and channels, besides making deposits of mud, sand, and gravel upon banks and bars. The greatest wear, however, in a rapid stream comes from the sands, gravels, and boulders carried in the bed, churned along the bottom, and rasped about the encompassing walls. These form not only a sand-blast under water but a battering-ram that breaks through and wears down the stoutest rock—even the Archæan rock through which the Colorado at El Tovar is now running.

The swiftness of a stream is, of course, dependent upon the slope of its bed, and the degree of swiftness (with the volume of the water) sets the pace for the boulders that are moved. A river running three inches per second will carry with it fine clay, six inches per second will shift coarse sand, twelve inches per second is sufficient to move pebbles a half-inch in diameter, and six feet per second means that stones nine inches in diameter can be rolled and pushed down the stream-bed. The moving power varies as the sixth power of the velocity. A stream swift enough to roll a one-pound stone has merely to be doubled in swiftness to roll a sixty-four-pound stone. The stream that will carry the nine-inch stone has a velocity of six feet per second, or about

two and one-half miles per hour. But the Colorado at the foot of Hermit Trail has a velocity ten times as great, or, say, twenty miles an hour!

The abrupt descent of the river-bed in the Grand Canyon is very pronounced almost everywhere. From the mouth of the Little Colorado to the Grand Wash, a distance of two hundred and eighteen miles, the fall is one thousand six hundred and forty feet. That means a descent of about seven and one-half feet per mile. Of course this is not uniform everywhere. In some flat stretches it is less, and over rapids and falls it is more. In the Kaibab division of the Grand Canyon the average fall is something like twenty-one feet per mile. At one place above Grand View the descent is one hundred and thirty feet in three-quarters of a mile, and the waves on the rapids there are said to be something like thirty feet in height. In such places the lifting and rolling power of the River is enormous. With its velocity it can hurl along boulders weighing tons and crush the hardest stone to powder. The striking, breaking, grinding power of these boulders, especially in flood-times, is, indeed, difficult to overestimate. When you are down at the River take up some of the sand that you will see pocketed along the shore and you will find it almost as fine as flour. Notice, too, the boulders in the stream, how they are rasped and rounded. They are being reduced to sand.

The River is a terrific grinding-mill—a mill that never stops.

Now the most pronounced wear upon a stream-bed such as this is vertical—that is, down in the channel. The bed if seen in a cross-section would resemble a V. The River is cutting down through the dark rock day in and day out, deepening its bed at the bottom and widening it at the top. But the wear upon the sides is not so great as down in the channel. The rub on the walls comes largely from what the River carries in its load—that is, sand, silt, and mud. The body of this silt is enormous again (the River bears to the sea each year more than three hundred million tons of it), but it has in itself no such grinding power as the stones and boulders hurled along in the bed. There is some slight wear on the walls from stones as well as silt, and eventually they break down; but, as we shall see presently, it is by the saw-through of lateral streams and the gradual cutting up of the walls into sections that they are disintegrated rather than by the River wearing along their faces.

So much by way of explaining the cutting of the inner walls—an explanation which the visitor will probably accept, since the Inner Canyon, or Granite Gorge, as it is called, does not bother him so much as the buttes, platforms, and walls that lie back from it and lead up to the Rim. Yet the River in its

initial depression made possible all the breakdown and destruction of the side walls and canyons and all the carving out of platforms and buttes. Water seeks its level, and wherever there is a sink or valley or depression of any kind, there the streams will pour their gathered forces. The deeper the Colorado digs its bed the swifter the descent and cut-through of the lateral or side streams.

It should be repeated and emphasized that no stream wears its banks or walls evenly and smoothly by direct rubbing—at least, that is not the way banks and walls are broken down in this Canyon country. The main stream is like the trunk of a tree. It has many limbs that run off into smaller branches, that in turn trail away into twigs and shoots. The walls of the primary canyon are cut through at intervals by side-streams that have produced secondary canyons; these in turn are cut at right angles by smaller tertiary streams and canyons, and so on into infinite ramifications. The plateau areas are drained through these subsidiary channels into the main trunk-river—the Colorado. As a result of this drainage system the plateau is sawn asunder by streams. Promontories, points, pinnacles, buttes are left outstanding, and, in turn, these are attacked, as the main areas were attacked, by small streams that eventually break them down.

Perhaps you will contend that there are no lateral

From a photograph by F. A. Lathe, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 5. GRANITE GORGE FROM PLATEAU POINT.

Tapeats cliff at left, Archæan rock at right, Colorado River 1,200 feet below.

or side streams coming into the Colorado because there is no running water in sight. Even on the maps one sees only the Little Colorado flowing in from the southeast, and a stream called Kanab Creek coming down from the northeast that almost runs out in dry weather. But there are ten thousand streams not on the map that run with every rain-storm. Look down into any side-canyon and you will see their dry beds. Every one of these side-canyons was produced by the stream that runs in its depth when there is a heavy shower.

It is a mistake to suppose these creeks unimportant because they do not have continuous flowing water. On your way down to the River by the Bright Angel Trail you will find, below the Indian Garden, a canyon cut out of the hard Archæan rock by the water that runs here after rains. Across the River you can see the enormous gorge called Bright Angel Canyon made by the drainage stream there. On either side of it you may count a succession of extended points, and between each pair of points is a tertiary stream draining the adjacent area. Once more, when you go down to Hermit Creek Camp you will notice half-way down the trail the heading of the creek and the great slash that it has made through the Red Wall. You may follow down that little creek several miles to the Colorado, and perhaps be surprised at its course through the rock

(Plate 6), at its upright walls, its contributory side-canyons, its water-worn caves, its gouged-out bed. Another matter of surprise is the finding of huge boulders in the bed that did not drop down from the walls overhead, for they are a different kind of rock. They were rolled and carried down from the Red Wall, the Supai, and the Kaibab strata far back toward the Rim. At the mouth of the creek where it joins the River you will find the rocks of all the strata in all sizes and in all states of wear, flung together in confusion—flung by the swift waters of this little tributary.

Hermit Creek is a continuous stream, but in fair weather it is a small brook running clear, clean water that seems quite harmless. In summer you can step across it almost anywhere. It is not this quiet phase of it that is responsible for the rock-carving of its canyon, but rather its turbulent stage when, swollen with rains, it rushes along as a mountain torrent. All the side-arroyos * then empty water, stones, gravel, and sand into it and increase the downward rush. Every hollow in between the little divides lying off at the sides of the creek contains one of these washes. They are usually and normally dry, but during periods of rain their flow may be very great. For example, back of the Hermit

* The name is usually applied to the dry beds or courses that run with water after rain.

From a photograph, copyrighted by Fred Harvey.

PLATE 6. HERMIT CREEK BELOW FALLS.

A lateral canyon in the making, gorge stage.

Camp buildings you will find a large arroyo leading to the east, and if you follow it up you will notice evidence everywhere, not only of much water-wear, but of tremendous power in the intermittent stream. Boulders weighing many tons have been flung about and lodged in hollows, beds of coarse stone and gravel are washed and heaped up in mounds, leaps over high ledges are frequent, and basins beneath them offer proof positive of great water-wear. There is no doubt about either the size or the force of such a stream in wet weather.

Once more, it is difficult to exaggerate the cutting, rolling, rending power of these storm-streams (Plate 9). You may be astonished by the steep descent of the Colorado—the descent that made possible its deep-cut bed—but that is slight compared with the downward pitch of some of the side-streams. Shinumo Creek, reached by the Bass Trail to the west of Hermit Creek, is twelve miles long, and in that distance falls five thousand four hundred feet, or four hundred and fifty feet in a mile.* That in times of great rain argues a torrent of terrific power.

The stream, big and little, has wrought havoc in this Plateau Country. Its windings and workings must be followed a little farther, for it is responsible

* Noble, L. F., "The Shinumo Quadrangle," Bull. U. S. Geol. Survey, 549, Washington, 1914.

not only for the Canyon and the Granite Gorge but for all the forms of the walls, the rims, the buttes, the promontories. Erosion here is the master-movement.

CHAPTER IV

ARENA-MAKING

THE bed of Hermit or Shinumo Creek, with its tributaries, is more or less typical of every canyon in the Plateau Country. The creeks are fed by the small arroyos, and the arroyos, in turn, by side swales and washes. At its head the arroyo derives from a watershed and it is only after it has cut down its bed that the side-washes are formed as feeders and drainage streams.

This process carries on regardless of whether the area is one of loose gravel or hard rock. If you will follow to its source the large arroyo back of the Hermit Camp you will find that it is fed by a wet-weather stream pouring down from the top of the Red Wall. The upper stream is brought together on the slopes of the Supai above the Red Wall and, pursuing a channel of its own cutting, pours over the edge in a waterfall. The fallen water gathers together once more on the lower Tonto platform, in which it has also cut a channel, and goes down to join Hermit Creek, and thus to the Colorado. Where it pours over the Red Wall you will find a lip, like that of a pitcher, worn in the rock, and under

it a staining of the rock with black and gray lichens for several hundred feet. This lip is the beginning of a cut-back, a fluting, an arena.

You will see the lip perhaps oftener and with better effect on the walls of the higher strata—the Coconino and the Kaibab. For the processes of stream-formation, rock-cutting, arena-carving can be traced without the least confusion up through the various slopes and strata to the Rim of the Canyon (Plates 11, 12). Every terrace or slope, however steep, is guttered and depressed in places, and it is in these depressions that the rain gathers, forms into a stream, and runs down over the wall, falling on the platforms below. Water is drained from roof to roof, from the highest to the lowest—the roofs flattening and spreading out in area and in watershed as they descend. The steep walls of the Kaibab and the Coconino pour water upon the slopes of the Supai, the Supai sends its gatherings over the Red Wall upon the Tonto platform, which in turn empties its streams into creeks that cut through the Archæan walls and finally reach the Colorado.

Now it must have been noticed by the most casual of observers that every stream coming down a slope or over a wall, by its own wear keeps cutting back into the slope or wall, grooving or notching the rim or edge over which it runs. In the

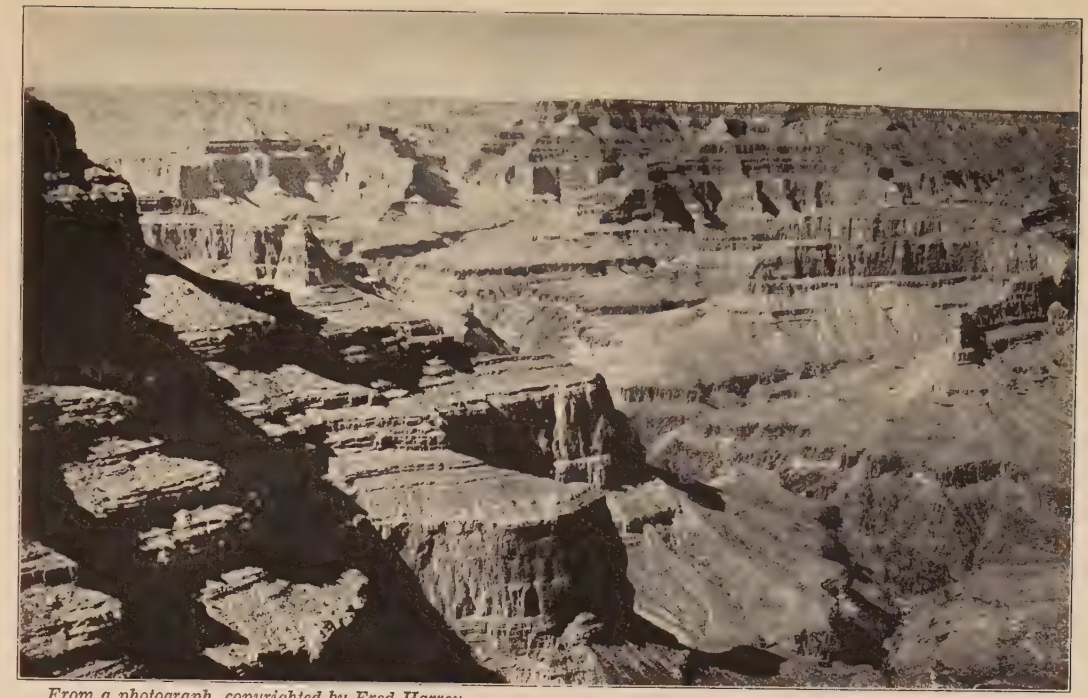
course of time, and with the deepening of the cut, the sides of it begin to break away and widen through lateral cuts that develop secondary grooves and notches. Where the rock is soft, the cutting and the widening go on together with swift pace; where the rock is hard, the cutting is narrower, deeper, producing rather abrupt walls. Thus the lateral cut-backs through the Archæan and Tapeats walls down at the River are generally sharp, rough defiles, narrow paths with vertical sides that one cannot go up or down without a rope (Plate 20). Above these walls the green shales of the Tonto Group are a much softer formation, and the streams easily wear them down and back. But not so with the next stratum—the Red Wall. Here we have a stubborn limestone that does not easily disintegrate. The gathered rains go over it in cataracts or waving waterfalls, and the upper edge of it is usually marked by a lip or narrow trough that pours the water down in a compact stream.

If you locate this lip or trough accurately you will find that it is usually in the central depression of a quarter-circle. No portion of the Red Wall runs on for any distance in a straight line. Everywhere it bends in and out, is serpentine in projections and recessions. The arenas or quarter-circles in it were all started by the widening of the lip at the back, and each arena in the course of time

continues to widen through smaller lateral cuts along its rim (Plate 7). A very large quarter-circle in the Red Wall will not only have its large trough and stream-bed at the extreme back but have also several lateral lips and beds formed, or forming, on its sides. Thus the arena is broadened and enlarged, often to great size, by the cut-backs of the half-dozen or more streamlets that pour over its edge (Plate 8).

Higher up on the walls there are waves and crescents cut in the Supai formation, above the Red Wall; but the sandstone and shale there is softer than the limestone, and the arena forms in it are not so large. They are too easily broken down to endure long in quarter-circle form. The appearance then on the Supai slopes is that of smaller serpentine windings—windings of the walls and ins and outs of the various layers. The same kind of erosion goes on there as with the Red Wall below, but the cutting is faster and more uniform, since the tendency of the water is to come down a series of steps as well as in a series of t oughs or depressions in the slopes. It is the broad wash from these red Supai steps that pours down the face of the Red Wall, staining it and making it appear as a red wall, although in reality it is a blue-gray limestone.

Above the Supai shales come the hard, abrupt



From a photograph, copyrighted by Fred Harvey.

PLATE 7. LATERAL CANYONS.

Granite Gorge running from right to left through middle distance.

walls of the Coconino sandstone and the Kaibab limestone, the latter being under your feet as you stand on the Rim. The water-wear on these upper walls is similar to that upon the Red Wall below—that is, the wear is in the most recedent portion of the Rim where the rain gathers and pours over the edge from a lip or trough. The tendency here as elsewhere is to form the arena, the half or quarter circle. Look along the Rim from where you stand and you will discover that it runs in flutings like a Doric column. Sometimes these flutings or arenas are not fifty feet across. They are, in fact, of all sizes. A small one shows directly in front of the hotel where you go to see the Canyon for the first time. On the way from the hotel to the head of Bright Angel Trail is a larger one that looks like an irregular crescent cut in the Rim. The middle of it—the point farthest back in the Rim—is just in front of the Bright Angel Camp. A stream runs there in wet weather and keeps cutting back, deepening the crescent. Around the edge of the crescent you can see on rainy days other little streams running together and finding ways by tiny lips over the edge and down the wall. These again are the beginnings of lateral cut-backs.

Now the whole Rim of the Canyon, on both sides of the River, is fluted and indented, notched with crescents of more or less pronounced character.

The arena formation is, in fact, characteristic of every wall hereabouts. The one to the left of the hotel to which attention has been called is only a small one. It is an arena within an arena. You do not perhaps see the larger one because of its bulk. It runs from Hopi Point to Yavapai Point —a distance of several miles. The hotel buildings stand in the recess of it. Where is the stream-bed that originally cut it back? Why, just to the west of the head of Bright Angel Trail. The trail lower down follows the stream-bed all the way to the River. It was this stream that not only created the larger arena but was responsible for the lateral canyon down which the trail runs (Plate 2).

Every one of the side-canyons here was started as a lip in the rock, became a crescent, and to this day many of them keep the semblance of the crescent form. That is to say, they are great indentations between outstanding points. The stage of beginning with a half or quarter circle is apparent everywhere. As for the water-wear, that, too, is so apparent, so obvious, that one asks naturally enough: Why is there so much more of it here than elsewhere? Why the torn arroyo, the slashed canyon, the cut and carved strata?

It is not difficult to answer those questions. The Plateau Country through which the Canyon runs is largely desert in character. The infrequent

rain, the thin soil, the high altitude all combine against any pronounced growth of vegetation, and there are great areas where practically nothing at all grows. Pines, pinyons, and junipers make something of a show along the Rim, but the trees are wide apart and rather stunted in growth; the underbrush is scattered, and as for the mosses and grasses, they appear only in small clumps and beds.

The rainfall here is not nearly so great in the aggregate as along the Atlantic Coast; but what rain there is, usually falls in heavy showers, often in what are called "cloudbursts." It descends in torrents for perhaps an hour, and then stops. Falling upon a rocky bed, or one with only a few inches of soil-covering, there is no chance for it to sink in anywhere. Neither is there sufficient grass, moss, or undergrowth to check its run-off. Immediately it begins to gather in countless little streams. And each stream as it runs carries with it sand and gravel which it empties into a larger stream. The force is cumulative, and the descent down the slopes to the secondary and lateral canyons and thus to the River is very swift. Each stream becomes a Colorado in miniature, battering and sawing its way along its bed, carrying what it cuts and loosens down to the greater River. No wonder the Plateau landscape is guttered and cross-guttered with arroyos and barrancas—canyons in little.

The Grand Canyon is the direct result of an erosion that has been going on for hundreds of centuries. Water is sufficient in itself to account for the great bulk of the destruction here apparent. And yet there are other causes that help on the general drag-down of the walls and add to the tale of ground rock that is carried each year from the Plateau to the sea.

The driving rains that beat directly against the faces of the Kaibab, the Coconino, and the Red Wall seem very futile in their fury. The walls throw them off easily enough, shunt them into the streams. But there is always a certain amount of damage done. In summer the rains beat into the seams and cracks of the rock and dissolve some of the cementing material that binds the grains together. Disintegration sets in. Certain particles are carried off by the drip of water; other particles are loosened and fall down as sand. Again, rain running down a face-wall follows the wall into hollows and caves, creeping and seeping along the ceiling, and perhaps finally dropping far within the cave. This once more produces a solution and a falling of rock particles from the ceiling as sand. Almost every shallow cave that one enters in this Canyon region will show a floor covered with sand—sometimes several feet of it.

Another process of destruction goes on in winter

with the freezing and thawing of rain and snow lodged in the crevices of the rock strata. Layers and sections of the wall are thus pried away from the main face and, in time, fall as blocks upon the taluses below. Eventually these blocks push down into the valley, become smaller, flatten out on the slopes or are ground to sand in the swift-running streams. Not only the walls but the buttes, the pinnacles, the ledges, the platforms, all suffer from frost. It is true that Nature tries to mitigate the damage and hold off destruction by growing wherever she can bushes, grasses, flowers, mosses, lichens that act as protectors of the stone. It is astonishing the places she chooses to grow them. What food there may be for plant life in a fissure of rock one hardly knows, but one finds flowers and grasses growing there almost as a rule rather than as an exception. Destruction to the rock is thus for a time stayed. But eventually the crumbling and falling process carries on.

Still another process of disintegration follows the rasp and cut of the uneasy winds. Always they are eddying and circling about the walls, the buttes, the spines, the towers, the ridges. They creep in and out of crevices and hollows and rush around arenas and amphitheatres often with much force. Almost everywhere they move, they carry or drive with them particles of sand. These are

flung against the walls or driven in an eddy about a shallow recess, or hurled with fury around the base of pillars. They cut like a miniature sand-blast. The result is more destruction. It is greater from the action of wind than is generally supposed, because it is incessant and wide-spread. No rock face escapes the blast. Whether gentle or fierce, it rubs and wears away.

And these rocks at the Canyon are peculiarly susceptible to the wear of wind and water. For one thing, they lie in horizontal beds, which is not unfavorable to erosive processes. Again, they are all of them, except those of the Inner Canyon at the River, made up of sedimentary deposits and lack the consistency of metamorphic and igneous rocks. Sandstones and limestones have not the resistant powers of schists and gneisses.

But the rock strata at the Canyon make up such an extraordinary story that they require a chapter by themselves.

From a photograph, copyrighted by Fred Harvey.

PLATE 8. HIGH WALLS.

Arenas and dry creek-beds across River, Colorado and Granite Gorge below, Kaibab walls at right.

CHAPTER V

THE GREAT DENUDATION

It is matter of common knowledge that the general reader does not care to have his story interrupted by too much information, scientific or otherwise. He looks for entertainment rather than instruction, and at the Canyon is perhaps quite willing to forego geology except in elementary and homœopathic doses. But geology here is more or less compulsory because it is everywhere in evidence, and everywhere important. It is the one spot on earth where certain rock strata may be read as in a book. It is not necessary to apologize for opening the book. The geological story is interesting in itself and is its own excuse for being.

The cutting out of the Canyon is the end of the story, not the beginning. It happened in late times—possibly the Tertiary Period—and is geologically considered a recent occurrence, though no one knows how many scores of centuries ago it first started. The process of cutting is still going on. The River continues to deepen, and in the ages to come the Inner Gorge may be cut down nearly to sea-level or the Plateau Country may subside, and

perhaps the Canyon itself may then turn into a fiord where still blue waters will lie under purple rocks and the rushing River will have cut back far into Utah or Wyoming. But that is a possible sequel to the story, at which we have not yet arrived.

We are of necessity greatly impressed with this latter-day cutting of the Canyon because of its colossal scale. It seems an erosion of proportions such as the world has never experienced elsewhere, and yet it should be stated at once that as compared with what preceded it the great chasm is a mere scratch in the shell—a minor affair. Before ever the Canyon was started this Plateau Country was swept by a denudation of vast extent. Over an area of about fourteen thousand square miles the whole surface was planed off and the beds of five geological periods disappeared from the top. At the Rim where you stand, under your feet, are layers of Carboniferous rocks, and upon these rocks were once upbuilded strata upon strata of sedimental rocks belonging to the Permian, the Triassic, the Jurassic, the Cretaceous, the Eocene. Ten thousand feet of them were once over your head. Many centuries ago they were cut out and swept away in what has been called "the Great Denudation." That sounds like a statement put forth to make people catch their breath, but it is susceptible of proof, as we shall presently see.

The rock strata seem to be laid down about the globe very much as the layers or various skins encompass an onion, though, of course, with no such regularity or uniformity. In places certain strata are missing, were perhaps never laid down. How deep down the distance before the strata end is a matter of some speculation, but at present geology contents itself with something like twelve periods, each made up of many layers or beds.* The normal and sequential appearance of these beds is often greatly disturbed or broken by accidents of upheaval and subsidence, flood and fusion. It is so here. The onion has had a number of layers gouged or washed out of it. Of twelve geological periods at one time existent, only six are now to be seen at the Canyon, and two of these appear only in remnants and fragments. There is plain evidence on every hand of a great disturbance—a great denudation.

When we look across the Canyon from El Tovar and see strata of the Kaibab and Coconino running along the North Rim corresponding to the strata on our side of the River, we cannot doubt that all the strata once extended across the Canyon and were somehow broken through, cut out and carried away by the River. The likeness holds good for a longer

* By turning to the cross-section (Plate 11), the reader may get the names and order of the periods as far as they appear here at the Canyon. They are further indicated in the photograph Plate 12.

view—for a view of a hundred miles to the north. For up in Utah there still exists a higher Rim—the broken face-walls of a greater Canyon—the strata of which were once spread over the whole Plateau Country. The higher Rim in Utah now appears in the form of huge cliffs with upright walls. At long intervals other cliffs descend from them in a great geological stairway, as Dutton* has put it—descend from the highest to the lowest, and stretch out in their descent from the lofty plateaus of Utah to the depressed basins of Central Arizona. We must come down the stairway to the Grand Canyon to realize the successive steps—to realize that each step in turn has been a temporary water-line during successive periods of the Great Denudation. The lines of the cliffs are still there.

The Markagunt Plateau, just over the southern Utah boundary-line, is eleven thousand feet above sea-level. The Rim at El Tovar is nearly seven thousand feet. Some four thousand feet of the lost strata are accounted for in that difference of elevation, and the remainder is explained by the dip of the strata to the northeast which carries the strata down instead of up. The strata at El Tovar, it will be remembered, are Carboniferous, but on the surface of the Markagunt they are Eocene—that

* Dutton, *Tertiary History of the Grand Canyon District*, Washington, 1882.

From a photograph, copyrighted by Fred Harvey.

PLATE 9. A DRY WASH.

It has been cut down from high points at top of photograph. Tapeats rock in foreground.

is, five geological periods later on, or, as we have stated it, about ten thousand feet of strata higher up.

The top layers of the Markagunt are uniformly bedded, lie flat and regular, and are composed of lake marls and fresh-water deposits. The face-walls, made by the Great Denudation, now appear as abrupt cliffs, and the southern line of them along the bases of the Markagunt and Paunsagunt Plateaus are now known as the Pink Cliffs. They are some eight hundred feet high, are rather square-edged like pilasters, and run on for many miles like an enormous broken colonnade. Their color is a brilliant rose-red, which varies under different lights, and in general gives a highly spectacular appearance to the face-walls. The Eocene ends at the foot of these cliffs and is not met with again in moving south across the Grand Canyon country until we reach New Mexico. The cliffs themselves make the first, the top riser, of the geological stairway we have imagined.

The platform below the Pink Cliffs and extending out from under them—the lower platform stretching away to the south—is made up of Cretaceous rock. The layers are of yellow sandstone and clay. This is the second step in the stairway, but not so abrupt a one as that of the Eocene. The tread of the step is not very broad directly south of the Pink Cliffs, and when the riser is reached it is not very

high, but this Cretaceous platform extends eastward into the Kaiparowits Plateau and southward across Glen Canyon upon the Painted Desert, where it appears as the high mesas lying back of Echo Cliffs. They may be seen readily enough from Desert View (Navaho Point). The mesa and the flat-topped butte seem more characteristic of the Cretaceous than the long file of uniform cliffs, though the latter do appear in striking form and color in the Paria Valley.

The third step down is from the Cretaceous to the Jurassic. The latter is made up of red shales that lie upon a massive thousand-foot bed of white sandstone. The sandstone shows in simple bold cliffs cut through into detached buttes in places. The cliffs appear without taluses, as though rising abruptly from an under platform. This simplicity is, of course, subject to some variation, and fantastic traceries occasionally appear in the Jurassic. The most notable appearance of this riser is in the White Cliffs of the Virgin. South of the Markagunt and Paunsagunt Plateaus the exposures of the Jurassic are very grand. It extends eastward under the Kaiparowits Plateau, crosses Glen Canyon, and appears over on the Painted Desert beyond Echo Cliffs and beneath the Cretaceous. But nothing of this nor of the Cretaceous or Eocene appears in or around the Grand Canyon.

The Jurassic and the Triassic are somewhat confused in their exposures, but it may be generally accepted that the Triassic is the fourth step down. The great stairway of terraces leading to the Canyon has no more splendid riser than that of the Triassic as shown in the celebrated Vermilion Cliffs between the Kanab and the Virgin. The color of the shales and sandstones is peculiarly brilliant in the Valley of the Virgin. Near Pipe Spring these cliffs of the Triassic have a height of between fifteen hundred and two thousand feet. They appear as the main escarpment or face of Echo Cliffs over on the Painted Desert, where they often show with great color-splendor when struck by the long shafts of the setting sun. But again no trace of the Triassic shows in or around the Grand Canyon. Echo Cliffs is the nearest outlier.

After the Triassic the next platform to which we step down is the Permian.* This is the series originally laid down upon the Carboniferous—the top series at El Tovar. The Permian is a distinct terrace, but not such a typical step as the other formations. In fact, the platform which shows the Permian also reveals much of the Triassic. The Per-

* Dr. F. L. Ransome, of the U. S. Geological Survey, to whom I am greatly indebted for reading the first seven chapters of this book, in manuscript, reminds me that the U. S. Geological Survey makes the Permian the upper division of the Carboniferous.

mian beds are thin and of impure limestone, with deep colors in belts of purple, violet, lavender, dark red, Indian red. They reach down from the Triassic upon the Kanab and Kaibab Plateaus directly north of the Grand Canyon. They appear again at the foot of Echo Cliffs on the Painted Desert. Remnants or remains of them are still seen about the Grand Canyon as survivors of the series—the hard cores that have resisted the Great Denudation, and now appear in butte form, standing isolated upon a Carboniferous foundation. Cedar Mountain, a few miles from Desert View, on the Painted Desert, is an example. Red Butte, which one sees from the railway coming up to the Canyon, is another, and Mounts Trumbull and Logan, over to the northwest, are a third. The Great Denudation washed them into butte form, but could not entirely destroy them.

All this Plateau Country was once under the sea —was laid down in horizontal beds as a sea-floor. In the fulness of time it rose, or was pushed up by lateral pressure, and for many centuries was probably a shallow inland sea. As it gradually rose above water it became a low alluvial plain, and its drainage system was then established by rivers that possibly still exist as the Colorado, the Virgin, the Paria. The rivers continued to hold their courses notwithstanding certain inequalities and deforma-

From a photograph, copyrighted by Fred Harvey.

PLATE 10. NORTHWEST FROM NEAR PIMA POINT.

Colorado River below, Point Sublime central on horizon

tions that afterward came into existence. They were perhaps older than the deformations and continued to run their ways in spite of the deformations, against the strata, against geological faults, against dips. They do so yet.*

The plateau continued to rise and at the same time to lose from its upper surface by erosion. The so-called Great Denudation extended south from the Utah plateaus to the southern deserts of Arizona. The geological steps do not stop with the Carboniferous at the Canyon Rim but continue to descend at the south until, on the lower deserts, almost at sea-level, we meet with the most ancient forms of the Archæan. The denudation took place over a vast area and probably carried on through many thousands of years.

And so it came about that the cutting of the Grand Canyon itself was an after-happening. For all its vast proportions the Canyon was merely a drainage ditch in the bottom of the huge basin originally hollowed out by flowing waters. It has since undergone some minor changes, but evidently the Great Denudation was never approached in far-reaching results. That was the climacteric happening—the supreme event.

* There is some difference of opinion among geologists as to whether certain streams came into existence before or after the principal disturbances of the strata.

As for the remaining geological strata or steps in the stairway, we do not need to follow them across Arizona to the sea. By trailing down into the Canyon we shall find the earliest of all, the old Archæan, in the Inner Gorge where the River runs (Plate 5), and on the way down we shall meet with the intermediate strata in the walls.

CHAPTER VI

THE CANYON WALLS

THE first five hundred feet of wall at the Canyon is called the Kaibab limestone. It can be seen exposed in cliff form anywhere under the Rim. It belongs to the late Carboniferous period* and shows shell life in many of its exposures. Fossil Mountain, just beyond Havasupai Point, is thickly strewn with these shells, but they may also be seen in the broken boulders along the Bright Angel Trail a hundred feet below the edge.

On the face-walls of the Kaibab rain and wind hollow out many recesses and small caves, though the general appearance of the cliff is smooth and rather abrupt—sometimes uncomfortably so. For this is the "precipice" of the one-day visitor. The steep descent, however, is seldom for more than two hundred feet. Then the wall breaks down into a rough talus where huge blocks are heaped, trees and bushes struggle for existence, grasses grow in the rock crevices, and flowers sway along the narrow ledges and platforms. Sometimes harder portions

* Called by geologists the Pennsylvanian because it is of the same age as the principal coal-bearing beds of Pennsylvania.

of the walls are seen standing out from the wall itself as turrets and pinnacles. A hard cap of crystalline limestone usually protects the top of the turret from rain while the winds carve the main shaft into fantastic form. These pinnacles are sometimes known as "dead men" or "hoodoos" or "monuments" and are seen in many places along the Rim. Thor's Hammer, on the way to Grand View, is the popular illustration.

The Kaibab is seen not merely from El Tovar but from every view-point at the Canyon (Plates 11, 12). Across on the north side it appears in greater thickness than near the hotel. Some of the larger buttes seen in the Canyon show it. The top cap of the so-called Temple of Vishnu, and also of Wotan's Throne, is made up of it. These limestone walls with their pale-yellow, cream-colored, and warm salmon tones undergo great changes with the shifting sunlight, especially at sunrise when they become golden, or at sunset when they glow with a fire orange, or at twilight when they appear amethystine. They are beautiful walls at all times and bear their part as a top cap to the Canyon strata with dignity and grandeur.

Directly under the Kaibab comes the Coconino sandstone, a buff-colored strata some four hundred feet thick. This is often cross-bedded—that is, laid down in drifts that are at loose angles to each

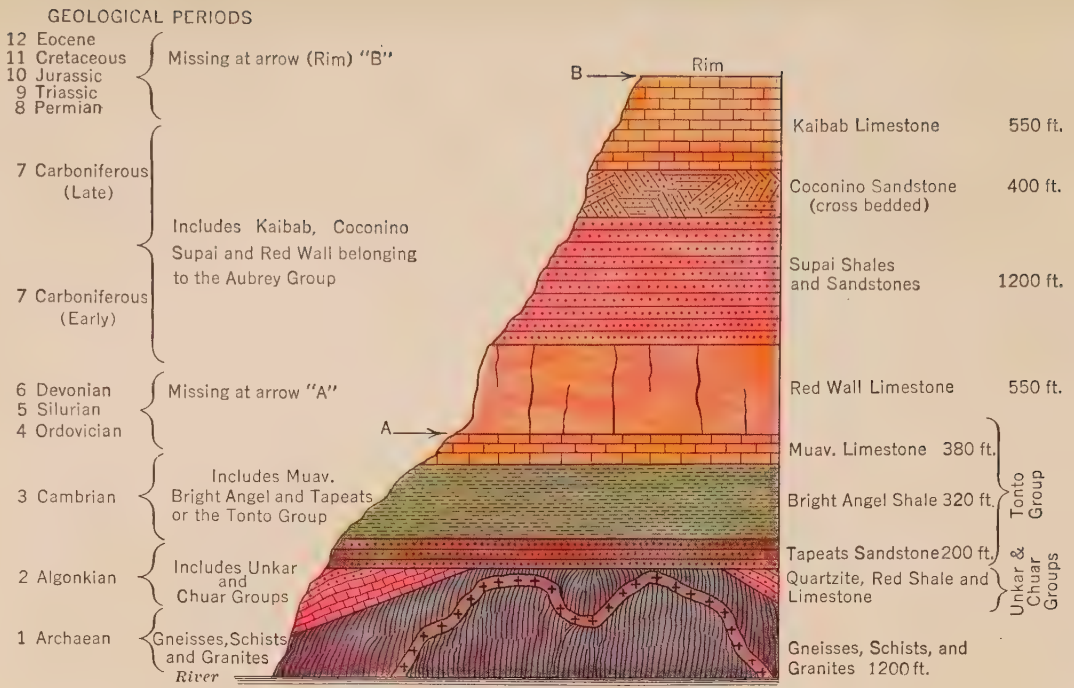


PLATE 11. CROSS-SECTION OF GRAND CANYON STRATA AT EL TOVAR.

other—but it makes up a stubborn rock and a steep wall. It is usually seen in perpendicular face with no talus or slope below it. Where it rests upon its underbasing of Supai formation (well shown at the left of Bright Angel Trail below the tunnel, or in the basin known as the Inferno) it fits as neatly and runs on as smoothly as though set up by a master mason. One is somewhat at a loss to understand how it could have been so evenly spread under the sea, how it could have been laid down so flat and flush upon the Supai as though done in a day, and how both strata were forced up into the open without bending, shattering, or breaking in any way. Was the rose-gray put down on the Indian red over night, or was it deposited, like falling snow, through thousands of years, so softly, smoothly, and evenly, that to-day, after these many centuries, it lies as flat as the sea itself? *

There are no fossils in the Coconino sandstone and, being a supporting wall, there are few outlying domes, turrets, or pinnacles. Occasionally portions of the wall are split off by frost and there are many rounded holes in the face-wall that look as though drilled by instruments, but the only tools used were the wind and rain. Where the cross-bedding occurs

* "Some geologists maintain that the Coconino was not deposited under the sea at all, but is a vast accumulation of wind-blown sand."—Note by Dr. Ransome.

there are minor faults and breaks which often result in caves—wind-worn caves with graceful curves and rippled, fine-grained, sandy floors of the most beautiful golden-pink color. But for all its flexures and weatherings the Coconino stands upright with sheer faces that are vastly imposing in lift, bulk, and weight. It is an extensive wall and one of the most prominent in the Canyon strata, because of its light color and clean exposure. It runs like a wide ribbon under the Kaibab. Across the River you can see many miles of it stretching east and west with remarkable regularity (Plate 12). Crumbling remnants of it cap some of the lesser buttes in the Canyon such as Isis and Osiris.

The Supai formation of sandstone and shale—the third group of strata in the walls—is very marked in its Indian-red color, and because of its enormous bulk it has much to do in determining the general color-tone of the Canyon. The red of these sandstones and shales shifts and changes much under varying lights. In the early morning when in shadow it is beef-blood red; at noon it is a dark terra-cotta; at sunset almost a fire red. These shiftings and changes are well seen at morning and evening in the basins known as the Abyss and the Inferno, to the west of El Tovar. The local color in the wall is due to iron oxide. Many of the beautiful harmonies of gold and orange seen

From a photograph by A. J. Baker, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 12 FROM YAVAPAI POINT, LOOKING NORTH.

Shiva central mass, Isis with cap at right, Colorado at left. *A*, Archæan rock. *B*, Tapeats cliff. *C*, Tonto platform. *D*, Bright Angel shales; *E*, Red Wall; *F*, Supai formation; *G*, Coconino sandstone; *H*, Kaibab limestone.

in the cliffs of the Canyon are caused by just such common things as iron oxide—mere iron-rust.

The Supai is some twelve hundred feet in thickness and is seen from all points at the Canyon (Plate 11). From the hotel Rim the so-called Battleship (Plate 1), in its superstructure, is entirely made up of these sandstones and shales, though the base of it (seen from the trail below) is the Red Wall. The texture of the beds is a little loose and soft, and the walls wash down easily into slopes that are usually marked by descending steps, the treads of which are sandstone and the risers shale. The steps and ledges, indicating successive beds, look rather thin when seen from the Rim, but in reality they may be from ten to fifty feet thick. Rains with their consequent streams wash down and over them, creating valleys in the slopes, little canyons in the rock. The slopes are usually marked by a good many small pinyons, scrub-oaks, berry bushes, with grasses and flowers. Where the growth is scanty and the rock formation shows through, the repeated lines of the steps remind one of a Roman circus. The arena effect is present everywhere.

The Kaibab, the Coconino, the Supai, and the Red Wall all complement each other in their carvings, but with great variety in their appearances. The harder walls show the large arenas and the softer ones the small flutings. Both of them are

superb in line. The Supai beds are more regular and graceful than the others, and individual layers can often be traced for miles in their wonderful serpentine windings. They were originally laid down in a shallow sea, and the red mud and sand of their composition were mainly washings from the neighboring shores.

This same red mud loosened by rains is to-day washing down from the Supai slopes upon the face of the Red Wall and staining that enormous underlying stratum a bright salmon-red. Its local color, as already suggested, is a blue-gray; but this color shows only in recently fractured parts or where the Supai has disappeared from the top and the local hue is allowed to reassert itself. Like the other wall colors, that of the Red Wall varies with the light and takes on many manifestations. In form the wall is a huge base upholding the strata above it, is largely a limestone with some alternating beds of sandstone, and is very compact, showing no horizontal lines of parting or bedding. There is a small talus at the bottom of it, but this is not a slope breaking down from water-wear so much as a rock heap accumulated by fallen fragments from the face-wall. The cliffs are almost perpendicular, and from the upper edge a stone will drop clear and sheer to the bottom. The Red Wall is between five and six hundred feet thick and is considered one of

the sturdiest strata in the Canyon. Receiving the accumulated waters from the upper slopes it wears back in enormous cirques or arenas—great amphitheatres that might seat half a million people. The miner and the explorer still worry along its upper edge seeking some break in the face that will let them down to the River, but the Red Wall keeps its inaccessible front. The only break in the edge is where streams run over it and cut a pitcher lip, and the only fracture is where a geological fault is apparent. The trails to the River lead up or down it where it is faulted, as at Bright Angel and Hermit; but not otherwise. It is one continuous precipice, the most abrupt wall in the Canyon, with no weak line about it. When seen from below, the bulk of it is vastly impressive. It seems to be the underbasing of the globe rather than a simple sedimentary bed laid down under the sea and dotted with occasional cup-corals here and there.

For all its hardness and stanchness there are some hollows in the Red Wall, made by wind and rain, that take on the proportions of caves. Sometimes the cut-back arenas in the face have projecting eaves or roofs over them—the wear being more rapid beneath than above—and this produces an open-cave effect. Again, one finds in places huge sections fallen out in blocks leaving square cells or spaces under the wall. But these appearances are

unusual. The Red Wall, generally speaking, symbolizes endurance and strength.

When the bottom of the Red Wall is reached we meet with trouble. The trouble is geologically called "unconformity." There are strata missing here—strata that are due to appear and yet are not seen. The Carboniferous ends under the Red Wall, and the Devonian, Silurian, and Ordovician should succeed, but the last two are entirely missing and the Devonian appears only in isolated fragments here and there.

What became of these strata? Perhaps they never existed—never were laid down here. The sea-bed may have risen when only the Cambrian series that now underlie the Red Wall were formed. That series may have been the top strata for many centuries, and then the whole plateau may have subsided beneath the sea and been covered by the strata of the Carboniferous. Who can now say?

But it is more probable that the land arose from the sea when the Devonian, Silurian, and Ordovician were in place and that these strata were eroded, washed away, before the subsidence in the sea that allowed the Carboniferous and later strata to be superimposed. There are theories on the subject—several of them—held by geologists and they are more or less tenable. Millions of years are stipulated for their working out. But neither the

theories nor the ages are vitally important to us at this time. The main necessity is to recognize that three geological periods with several thousand feet of rock strata are gone between the Red Wall and the Muav limestone—gone without changing the dip or greatly ruffling the surface of the underlying limestones on which the Red Wall now rests. Their disappearance we may count a Canyon mystery and let it pass at that.

The strata that now follow under the Red Wall belong to the Cambrian Period and are usually referred to as the Tonto Group (Plate 12). The first of the group is the Muav limestone. It underlies the base of the Red Wall and does not show to advantage because the talus of the Red Wall rather hides it. On Bright Angel Trail it is inconspicuous, though there is as much as three hundred and fifty feet of it. It is thinly bedded, finely mottled, bluish in local color, but stained to a warm tan, or in places pale green, by exposure. Few fossils have been found in it, whereas the beds lying under it are marked with them. Geologists are interested in the Muav limestone, but its strata will hardly attract the attention of the average visitor.

Below this Muav limestone are the so-called Bright Angel shales which spread enormously because they are soft, break down easily into slopes that flatten out and merge into a platform or ter-

race sometimes miscalled "the lower plateau." The thickness of the shales is not more than three hundred and fifty feet, but their slopes spread down and out in places for great distances.

These Bright Angel shales are easily recognized anywhere and everywhere by their graceful rounded contours, their smooth water-worn slopes, their shallow arroyos and stream-beds, and, above all, by their Nile-green or yellow-green coloring. The color is refined and delicate and responds quickly to every change in sky and cloud. Some of the most beautiful color-harmonies at the Canyon come from the juxtaposition of these greenish shales with the salmon hues of the Red Wall above and the heliotrope and raspberry reds of the Unkar Group below.

The flattened slopes of these shales reach out and down toward the rim of the Inner Canyon, overlying in thin sheets or shingles the strata known as the Tapeats sandstone (Plate 30). A false sagebrush with sad-colored cacti grow upon them, wild burros use them for a stamping-ground, and coyotes, lizards, and snakes love their isolation. There are trails across them leading east and west in the Canyon depths, and from them wonderful sights are to be seen. Not the least of the sights is the overlook into the Inner Canyon with the Colorado running like a mad mill-race twelve hundred feet below.

The Bright Angel shales are followed by two hun-

dred feet of the Tapeats sandstone, coarse-grained, cross-bedded, and very stubborn in texture. Its side-canyons have abrupt walls that are as impossible of ascent or descent as the Red Wall. The layers of it seem thin and brittle, snapped off on the faces in sharp fractures, with shallow ledges that only the owls and the eagles seem to know intimately (Plates 5, 6). These beds of Tapeats sandstone are occasionally broken through on their backs in cubes or sections like a shattered pavement. The breaks develop with rains into sunken basins of enormous size with ragged-edged, inaccessible walls. At the base of buttes both the green shales and the Tapeats sandstones are frequently broken through and cut out by great water-wear, but the far points of the base or platform remain unbroken and extend out as star-shaped arms that appear like pedimental supports of the buttes themselves.

The thin slab-like layers of the Tapeats do not make a wall that is commanding in mass, though it bristles with difficulties for the climber. Nor is its color (a brown or buff; in places a dull maroon) very alluring. It is more curious than attractive because of its age, its pebbly grit, and its wave markings formed under the sea. At its base, as also along its top, are many recesses or caves, some of them due to structure, some to stream-wear, and some to the seeping and falling of water through

the rocks from above. Again, there are many crevices along its rim that seem to be bottomless. A stone thrown down them will rattle its way out of sight and hearing without coming to a halt. The Tapeats forms the cap to the rim of the Inner Canyon. It extends out to the edge and breaks off abruptly in a brown cliff over the old Archæan wall (Plate 5). So perpendicular is its face-wall that, once more, a stone can be tossed from the top into the stream below without difficulty.

Between the Tapeats and the old Archæan comes another gap in the geological record called "the great unconformity." Some twelve thousand feet of the Algonkian system are here missing, but portions of it—the so-called Unkar and Chuar groups —still remain in sections and wedges (Plate 11). Why and how they have survived is matter of theory in which geologists practically agree. The beds were originally laid down on the smooth, planed-off surface of what is called the old Archæan rock. This old rock is not exactly the original crust of the earth but a rock changed by heat, pressure, and intrusions from below. This metamorphosed rock and the beds lying upon it were bent into arches and hollows by deep-seated earth forces, and in places were broken into blocks. Some of the blocks were moved up and some sank down, the sedimentary beds in the down-dropped blocks being

thus inlaid into the original floor. When erosion came, the greater part of the Algonkian system, including huge portions of the Unkar and Chuar, were worn off and carried away, but certain other portions, being perhaps protected by their inlaid position or being of harder fibre, remained intact. Afterward there was a subsidence under the sea of the whole area, and for many centuries the laying down of the Tapeats sandstone, with succeeding formations, took place on the eroded surface of the Archæan and around and over the remaining blocks and portions of the Unkar and Chuar groups. When, after the second upheaval, the Canyon was carved out, the surviving portions of the Unkar and Chuar appeared as detached sections surrounded by the Tapeats, or lying irregularly between the Tapeats and the schists of the old Archæan.

These Unkar and Chuar groups are known to-day as the Grand Canyon Series, and sections of them appear in half a dozen places in the Canyon. A portion of the Unkar shows across the River to the left of Bright Angel Canyon. The best view of it is from the Turtlehead on the Tonto platform, but it can be seen from the hotel Rim without a glass. Its distinctive mark is its raspberry-red color, tempered with a what-not of mauve, heliotrope, and violet. At the Turtlehead you are on a level with it looking across the River, and can see its irregular

disposition, as well as its later surrounding and partial overlaying by the Tapeats sandstone. The section begins to show at the left, far down the River, under the foot of Isis Temple, and continues under the cliff wall of Cheops Pyramid. Straight across the River from you the light-colored shelf of the Tapeats breaks off and is succeeded on a lower shelf by the Unkar, which persists as far as Bright Angel Canyon. A little mound of the Unkar—a remnant left over—appears on your side of the River to the right and above the last lap of the Bright Angel Trail; and above this mound there is a shelf of the same stratum almost on a level with the Tapeats.

The Unkar is, all told, the most precious piece of local color at the Canyon, and with the curious forms of the beds, slopes, and pits goes to make up a very unusual appearance. At Bright Angel the mauves, magentas, and vermilions of the slopes, the purples of the wave-shaped layers that come out to the edge, the old velvet quality of them all is very striking. At sunset these colors change to wonderful tones, especially if there are clouds above them that catch light and color from the west. With rains the colors change once more to brighter notes, and some of their splendor runs over the edge and down the face of the old Archæan rock, staining that an indescribable but unforgetable hue.

The largest outcrop of these Unkar beds is to the east of Grand View, where they extend as far as the mouth of the Little Colorado. There, too, the Chuar beds come into view with a more diversified coloring than the Unkar. But they are not accessible to the average Canyon visitor because the way there is a difficult one to travel.

The rocks composing these two groups are made up of limestones, sandstones, shales, quartzites, conglomerates, and were originally laid down as shallow-water deposits, the Unkar first and the Chuar later. They were greatly eroded, as we have already premised, after upheaval. Only the hard cores and the deposits protected by inlaid positions remained. These portions show no fossil life. Their continuance surrounded by the Tapeats sandstones or lying at odd angles on the Archæan (or, as they are called, Vishnu) schists creates one of the most interesting of all the geological appearances at the Canyon.

With the crystalline schists that underlie the Unkar and Chuar beds we come to a swift transition. All the rocks of the Algonkian and Palæozoic systems—that is, all the rocks in the Canyon walls above the Archæan—are of sedimentary origin. They were deposited in flat beds under the sea and heaved up—for the most part with little break or fracture—to their present horizontal positions. The

Archæan schists, gneisses, and granites that make up the inner walls (or Granite Gorge) of the Canyon are of very different structure (Plate 5). They do not lie in horizontal beds but are on end, gnarled, crumpled by pressure, fused by heat. The schists are metamorphic rocks entirely recrystallized by heat; the gneisses and granites are igneous or fire rocks. The fire-rocks lying beneath pushed up through and helped metamorphose or change the rocks above into schists, at the same time being themselves recrystallized and twisted into fantastic shapes that set as they cooled. The result is some twelve hundred feet of rock that in interest for the layman outstrips any in the Canyon.

The Archæan flanks both sides of the Colorado at Bright Angel—the River flowing through and over it. The sides are almost perpendicular, are rough in surface, and are accessible to the climber only in spots. The rock is very hard—the hardest in the Canyon—is cast into slag forms by heat and pressure, and is not only worn and cut by water, but is broken by heavy boulders. The rim or edge is fluted like the Kaibab by streams that pour over it from the Tonto platforms, but the indentations are irregular, shallow, and not pronounced in curvature (Plate 23).

One cannot imagine anything more uncanny than these inner Canyon walls (Plate 19). They are ap-

propriate lining for the interior of the Pit, and in places where they break down in conjunction with Unkar beds into huge pot-holes (notably near the foot of the Lincoln Point Trail) they are almost too creepy for enjoyment. They are grim and unearthly, a mixture of everything that can be made by heat, fusion, intrusion—the flux of the great furnaces down below. No one knows how deep they lie. There are pale indications of old stratification about them, as though at one time they may have been bedded, but they have been so bent and blurred by heat that recognition is difficult. Perhaps they once lay on a great flat plain and the plain stretched out into infinite distance with a crystalline surface upon which was neither water, air, nor life. The newly formed world may have cooled down to such a surface. But that was before either the Colorado or the Canyon. Down here in the Granite Gorge you are not merely prehistoric and pregeologic; you may be looking at walls that date back to the cooling of the crust.

No doubt much of their strange appearance is due to their color. This is a dark purple varied by every imaginable shade of violet, warmed by reds that suggest dark rubies and garnets, streaked by broad intrusive bands of rose granite that wind in serpentines along the walls, and glittering with countless flakes and faces of mica. Seen at noonday

under full sunlight it makes a most astounding spread of dark-reddish purple. The eye wanders over it bewildered by the great blend, the splendid glow of it, and yet fully conscious that infinite variety of color, rather than sameness, makes up its harmony. To add to the bewilderment the mica glintings give the wall in places a satiny sheen. And the bent and twisted strata keep beating into your eye and brain the story of fire—the fire that perhaps once glowed in the Great Pit in the heart of the earth. It is a true enough Plutonian bed through which the red Colorado runs.

CHAPTER VII

BUTTES AND PROMONTORIES

THERE are probably few, even among the doubters, who regard the buttes in the Canyon as of volcanic origin. Some of the tepee-shaped ones look not unlike volcanic cones, but there is no igneous rock or ashes in their make-up. They are all of them laid down in uniform strata and are composed of sedimentary beds—the same beds that are seen everywhere in the exposed Canyon walls. From which it may be inferred, perhaps without error, that the buttes were once part of the walls.

How did they become separated?

By one of the processes of erosion so very apparent that it seems like explaining the obvious to point it out. It has been suggested that after the Great Denudation the Plateau was canyoned by the River, that the canyon walls thus created were cut into transversely by such streams as Bright Angel and Hermit Creeks, that the streams cut back into the walls, that the walls became fluted into recesses called arenas and projected out into points called promontories. Well, the butte is the end of the promontory cut off and isolated.

What cut it off?

Why, water from gathered rains, which, finding a depression in the promontory back from the point, began cutting a transverse stream-bed down each side of the ridge. The process of sawing off the point of a promontory with water and sand is, of course, a matter of many centuries, but Nature is never hurried in her processes. Time is not the essence of any of her doings. As yet she has sawn through none of the projecting points down to the old Archæan rock. The deepest of the cuts reach no farther than the foot of the Red Wall, with the Tonto shales for a base platform. Eventually the base-line will be down in the fire-rocks, and then perhaps the top of the buttes will have been washed away; but at present many of them still lift their heads up to the Canyon Rim.

You may see the sawing and separating process going on almost anywhere in the Canyon. The Battleship promontory, for example, lying to the left of the Bright Angel Trail, has its high points in upper decks and a turret, and between these and El Tovar Point, of which the Battleship is an extension, you will notice a depression or saddle of some hundred feet or more (Plate 1). In periods of rain a stream pours down from that depression into Bright Angel Creek on the east (you can see its dry bed and fall over the Red Wall plainly

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PLATE 13. THE CATHEDRAL.

A typical butte, Archæan rock foreground.

enough from the hotel) and another stream pours down into Horn Creek on the west. The streams are cutting away the Battleship from its mainland and making of it a butte. It will take many years to complete the severance. While the cut has been deepening, the top has not been allowed to go scot-free. Erosion has taken off the Kaibab and Coconino strata. The red rocks of the turret belong to the Supai formation. And they, too, are crumbling —are in process of disintegration.

Just over the Battleship is the point of a promontory called Dana Butte. It is already called a butte before separation from its parent body. Water is at work at the depression behind it, though it is now merely a narrow ledge. Farther down the Canyon there is, on the south side, a point that is cut away from the Plateau so much that no one living has ever been able to cross over to it. It is known as No Man's Land, though on the map I believe it is put down as Drummond Plateau. Guides and explorers look at it longingly, thinking that perhaps there are Indian relics to be found on the flat top. But there is no reason to think it different from any other isolated portion of the Plateau. It is simply a butte in the making that has been cut off by a rear gorge from any human inquiry.

None of these illustrations set forth the complete butte—the mountain in the round. There is only

one good example of it south of the River, and that is Mt. Huethawali. It stands on a rocky platform opposite Bass Camp and centuries ago was isolated by streams that cut it out on all sides at about the same time. It is a mountain in little, being six thousand two hundred and eighty feet above sea-level and about eight hundred feet above its immediate platform. Crumbling masses of the Coconino still form its top and the Supai makes up its body and base. It is an excellent example of butte making by stream-wear. Dry canyons and arroyos are now on every side of it, and they indicate that the erosion must have been enormous.

How does it happen that Mt. Huethawali is practically the only butte in the round on the south side of the Canyon? The "towers" and "temples" and "castles" are, for the most part, on the north side of the Canyon—across the River. What brought that about? If you look at a map of the Canyon you may notice that the stream-beds on the north side cut back into the Rim three times as far as those on the south side, that the extending promontories are three times as long, the buttes ten times as many. From the River to the Rim on the north is ten or more miles; from the River to the Rim on the south is only three or four miles. What is the meaning of that?

It has already been stated that there was a great

descent from the high Utah plateaus down to the Canyon—a downward step over cliffs and platforms in the guise of a geological stairway. The downward slip continues across the Canyon. The North Rim is higher by a thousand or more feet than the South Rim. A thousand feet of descent in fifteen miles is a swift pitch for running water. Whether normally draining the Kaibab Plateau with small creeks or cutting it fiercely with rain-swollen streams, the wear is very great. No wonder that these streams cut back into the north plateau, that long points or promontories extend out southward into the Canyon, and that transverse drainage streams cut out many buttes and "temples."

Not only is the descent and the consequent water-wear greater at the North than at the South Rim, but there is more water in volume. It must not be forgotten that the rise from the Canyon to the Utah plateaus is something over four thousand feet. There is more rainfall on the Markagunt than on the Coconino Plateau, for no other reason than that it is more elevated. When there is a storm in the Canyon it clears up along the South Rim before it does along the North Rim, and if there are clouds in the Canyon they lift and drift and skulk along the northern edge last of all, because of the higher altitude and colder air over there. The greater rainfall on the higher plateaus drains

down the geological stairway with swiftness, and more or less of it finally comes down through the gulches of the North Rim or seeps out through the strata as springs.

Now, as you stand on the South Rim, near the hotel, you will notice that you are on a slight elevation. The land slips away from you down to the railway-tracks and back through the Tusayan (or Coconino) Forest to Williams and beyond. Your trip up from the main line of the Santa Fé was an up-grade trip. A railway-train can travel up-hill but a stream of water cannot. Hence, you find very few streams emptying into the Canyon from the south. Those that do, such as the Little Colorado, have canyons so deeply sunk that they overcome the surface grade. The drainage into the Canyon from the south extends back only a short distance. More often the waters run away to the south, sink to underground rock fissures, and then creep back to the Canyon, coming out below the Supai shales or the Red Wall as springs. The southern drainage is neither large in quantity nor swift in descent as compared with that at the north. Hence, the south-side canyons are not so much cut back, nor the promontories extended so far toward the River, nor the buttes so pronounced in their isolation, as at the north. The buttes are, to be sure, huge enough to make one stare, but on the other side they are stupendous.

Shiva is as high as the Rim and, according to Dutton, has a mountain mass as great as Mt. Washington. All of the Carboniferous strata show on its wall, and, though we cannot see its base, we know that it is down on that old Archæan rock of the Inner Gorge. A mile in height and a mile in diameter across the top! Brahma, Deva, Zoroaster (Plate 14), Manu temples are about the same height, if somewhat less in bulk. How was any one persuaded to think of these enormous masses in terms of formal architecture! There never was a temple of Shiva or Brahma that lifted five hundred feet or could hold five thousand people, but here you have the carved forms of Nature that reach up nearly seven thousand feet, and, if hollow, might hold a million souls! In all their many centuries of existence they have never heard the footfall or the voice of priest or worshipper, or had any association with humanity. How easily, securely, undeviatingly from the perpendicular they have stood through the ages, while the Indian temples have been falling away stone by stone, crumbling under their own weight, flattening into their own dust!

The pyramid of Cheops at Gizeh was the labor of thousands of slaves over many years. When the capstone was put on the top, the height reached was four hundred and eighty-two feet. But here at the Canyon the so-called Cheops Pyramid was

the labor of Nature over thousands of centuries, and to-day, after ages of erosion, it still lifts skyward over five thousand feet. Perhaps the first marauder who broke into the tomb in the heart of the Gizeh Pyramid was brought to a standstill by seeing in the dust of the floor a naked footprint—the footprint of the last attendant who had gone out and sealed the door behind him five thousand years before; but here in the under-strata of the Canyon Pyramid are the sand-ripples left by the waves of a primal sea perhaps five million years ago. You can almost see to a nicety just where the last wave broke. These are the footprints of Creation, beside which those of the human seem so small and so inconsequential. Why was association with the work of man ever invoked here at the Canyon? Nothing that he ever did looks other than foolish compared with the master-work of Nature.

But Nature takes down her own structures as remorselessly as she puts them up. She is taking down the buttes, grinding them to sand, carrying them away. All of them are subject to the same wear as the walls, and water cuts them as readily as the Rim. The rounded butte is guttered, gullied, and ravined on the sides, cut back in shallow canyons that have protruding points and promontories. Here once more is the fluting process carried on by streams that run during heavy showers. It is

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PLATE 14. COLORADO RIVER FROM FOOT OF BRIGHT ANGEL TRAIL.

Granite Gorge walls right and left, Zoroaster Temple in distance.

the same process at work everywhere. Perhaps you can see it better at the base than elsewhere, for here the notches or flutings are often repeated in the pavement of Tonto shales, as has already been stated. The pattern of the base seems star-shaped, and between the promontory arms of the star are the washes or arroyos broken through the Tonto platform. Above these arroyos the amphitheatres or crescents of the Red Wall appear everywhere (Plate 8).

As you look out from the South Rim at the buttes across the River you perhaps notice that between any two of them there is a little canyon—a creek-bed with abrupt sides that looks small until you see it through a glass or cross over to it. These creek-beds extend back and often reach behind the buttes. They furnish the runway for the streams that cut the buttes from the main Rim and isolate them in the Canyon. They also furnish ground sands, gravel, and broken rock wherewith the cutting is done. It is all erosion—cutting out and washing down. Everything is carried back to the great sea. New beds are to-day being laid down in the Gulf of California that some time may be heaved up into canyon walls or a continent as yet undreamed of in our geography.

Many of the buttes are flat-topped and have growths of juniper and pinyon similar, if less robust,

to those at the Rim. The side-walls have been recently exposed, and consequently are steep in descent. The Red Wall especially, for all its scoops and cirques, stands upright and is as defiant of climbers as of weather. The explorer creeps around the base with difficulty, worrying along arroyos and platforms; but he does not go over the top. So it is that the majority of the great buttes have never been scaled. They are still unknown enchanted mesas with a silence and a mystery all their own.

Notwithstanding their flat tops, all the buttes cut out in the round have a tendency to wear away at the apex and become tepee-shaped. That is not only brought about by the slashing of rains and winds around the top, but by the washing down of stones and gravels which accumulate at the bottom. The accumulation takes the form of a talus or slope which spreads out at the foot and gives the appearance of a wide base that upholds the butte. It is merely an appearance, for the walls descend perpendicularly and are not re-enforced by the talus, but the illusion of the butte being based in broad and mighty platforms is nevertheless helped on. Dutton speaks rather ponderously of the effectiveness of these "segments of hyperbolas of long curvature that concave upward." They lend stability to the upper structure.

And also grace. Grace is something frequently found in the heaped stones and gravels of the taluses. The rounded lines of these and the flowing lines of the Tonto slopes are mighty contrasts to the upright faces of the Red Wall, the descending steps of the Supai shales, or the ragged cliffs of the Coconino sandstone. The contrast seems to magnify the quality of each—that is, the slopes and taluses become more sweeping and rolling, the walls more elevated and positive in lift and force. As a result the buttes loom and bulk colossal (Plate 13). What enormous strength is symbolized in the outlines! What a feeling of mass and weight in the flat face of the walls! There is no better illustration of the sublime in landscape. Mont Blanc, Niagara, the Pacific have always been put forth as examples of sublimity, presumably because of their mass and spread; but why not Shiva here in the Canyon that to mass adds lines of grace and force, with color that is both exalting and compelling?

The buttes have the same coloring as the walls of the Canyon, only there is more of it—color on all sides instead of merely on a face-wall. And being in the round they catch more sunlight, throw off hues in more varied tones. But they have their times for splendor and are not uniformly brilliant from dawn to dusk. In fact, at noontime, with the sun overhead, they bleach out and their local hues

are lost in blue-grays. Noon is the worst possible hour at the Canyon, so far as color is concerned. Only at dawn or after sunset do the walls and buttes warm up and glow with hues both local and reflected. It is one of the astonishing features here that rough-faced rocks can reflect such brilliant cloud and sky effects and that the local yellow or rose or red can shift into orange or carmine or violet so quickly and without effort.

Not only the color undergoes change from dawn to dusk but the forms shift, appearing and seemingly disappearing with varying lights. Dutton mentions this in his monograph; and the early Spaniards—the first white people to see the Canyon—spoke of buttes that faded away at noon and came back at night. No doubt the Spaniards attributed the appearance to things supernatural, but it was then, as now, merely an illusion brought about by light. The planes of landscape are greatly flattened and often disappear under direct overhead light. Perspective is wrecked, distance is telescoped, lines are blurred, surfaces are deadened into mere tints, objects at a distance are confused with objects near at hand, and often a blue haze of atmosphere perhaps blots them out entirely.

These strange effects are not strange as soon as you discover the reason for them. They are almost always noticed from the high point of the Rim.

Now at the Rim you are looking down into a tremendous trough in the ground. It is like seeing a valley from a mountain top or the earth from an aeroplane. The first things missed are the shadows. You cannot see them, for they are underneath. You are looking into reflecting high lights. Usually in landscape we look not down but straight ahead, and objects are distinguished by their shadows in contrast with their lights. In other words, we recognize them by their drawing. But looking down into the Canyon the drawing is largely lost because of the absence of shadow and the presence of color in closely related tones. What wonder that perspective should often go out in a blur of blue!

And you will notice further that you are not looking at buttes or walls in silhouette against the sky, as you might see Mt. Shasta, for instance, but at buttes seen against buttes and walls against walls. Such relief as there is shows as color against color or texture against texture, and not as dark against light. That is more cause for the blurring of perspective and the telescoping of planes. As for outlines, the sharp edge of Shiva shown against a background of gray wall may go for nothing as definition. So that while this absence of shadow and blending of hue may make for tonal harmony, it also makes for lack of definition, for flattening of planes and perspective, for dissipation of relief and drawing—

in short, for the apparent disappearance of edges, walls, and buttes.

Naturally, such disappearances occur when the sun is directly overhead and shadows are least in evidence. Then it is that many small buttes and promontories are overlooked, that amphitheatres in the Tonto platforms are not seen, that washes and arroyos and side-canyons are as though they had never been. Then, too, the reds and oranges and purples of the Canyon depths get dull and mouldy-looking, the air becomes a metallic blue-silver, the light diffuses and spreads rather than concentrates. It is a disappointing time because one's vision is confused. The Canyon appears merely as a tone effect in bleached hues.

But just as soon as the sun begins to slope to the west a change takes place. The shadows begin to lengthen behind each wall and butte and pinnacle. Straightway the huge forms come forth in their massiveness, lift up, spread out. Drawing comes back and with it perspective. The air changes to lilac or purple, the light falls in concentrated shafts, warming the colors on the slopes of the Supai, bringing out the raspberry red of the Unkar Group, and turning the chocolate of the Granite Gorge into a lively purple. The lower the sun sinks and the sharper the sun-shaft, the farther back fall the resultant shadows, the stronger the relief of scarp

and dome and arena, the higher the leap of every tint and hue in the Canyon. Gray becomes golden, red turns into carmine, blue becomes gas blue, and lilac becomes bright violet. The final blare of color is likely to come after the sun has perhaps dropped below the verge and the upper sky is all aflame. Then the Canyon catches up the overhead reflections and spreads them atop of its own local color to make a color gamut the like of which is seldom seen on land or sea.

The tale is repeated at dawn. The walls warm from fawn-color to orange, grow pink, grow red, grow gray. Shadows lengthen and define, then contract and grow vague. Buttes disengage and stand out, then dissipate and practically disappear. Never while the sun travels across the arc of the blue is there any standstill to the panorama. It is always shifting and changing, but its most brilliant display is at dawn and dusk when the sun-shafts are the flattest and the shadows are the longest.

CHAPTER VIII

BRIGHT ANGEL AND HERMIT TRAILS

THE tourist in the valley is always plagued with a desire to climb the mountain that lifts before him, and here at the Canyon, where he is virtually on the mountain's top, he is tormented with a wish to go down to the River five thousand feet below. Whatever our point of view, it never seems quite right. That which we have is as nothing compared with that which we have not.

It is somehow thought that one cannot see the Canyon without a trip down to the River that caused it. And then there are those who wish not so much to see the Canyon as to "do" it, and "doing" it means descending Bright Angel Trail on a barrel-bellied mule, accompanied by a guide in "chaps" and cowboy hat. No trip here is quite complete that does not include a dusty day on the trail with a river-party. And for those who cannot, or will not, see the Canyon in any other way, it perhaps has its advantages.

For the depth is worth seeing, afoot if you can, astride if you must. Bright Angel is a good foot-path, and any normally healthy person can go down and up it in a day and be not the worse for

wear. It is safe enough, either by foot or by mule, notwithstanding the "dizzy precipices" and "beetling heights," in the perfervid language of those who have just returned from the trip. There are no precipices or abysses on the Bright Angel (Plate 2). You meet with slopes and descents where you might be injured by a fall, but then you might break an arm or a leg down the hotel steps. There is nothing dangerous about the principal trails to the River, though some of the lesser known, such as the Boucher, creep around abrupt descents. Those who are anxious to go down a difficult trail should travel forty miles west to Havasu Canyon and descend to the Indian village three thousand feet below. There are four trails down Havasu, but the Wallapai on the west side will probably satisfy the most daring. In spots it is almost aerial.

Some distinct advantages follow the going down Bright Angel afoot. You are not hurried or worried by your fellow travellers and can take your time. And you can dispense with the brave guide, who is usually more or less of a superfluity. You could no more lose the trail than the Rim or the River; and there are no bewildering forests, no wild beasts to rend you. You will not be attacked by a side-winder, or a Gila monster, and not even a hydrophobic skunk is likely to cross your path. Bright Angel is too well travelled for trouble.

It is perhaps the oldest trail at the Canyon. The bighorn and the Indian followed it many years before the coming of the white man, trappers and explorers used it before Powell, and when copper was discovered in the Canyon a mining company took it over and made it navigable for burros freighted with packs of copper. It was copper that built most of the railway up from Williams in connection with the trail, and when the mine failed it was the Santa Fé that took over the railway, completed it, built El Tovar at the end of the line, and opened the Canyon to tourists—even down to the River and beyond.

The trail starts in at the left of Bright Angel Camp. The descent is quite rapid by the zigzags, and in a few minutes one is a hundred feet or more below the Rim (Plate 15). Boulders are hanging on the slopes, and the steep wall of the Kaibab is almost within touch. This latter is a hard limestone, and on the weatherings of it, or on fallen boulders, you will notice small fan-shaped sea-shells embedded in the rock. They are curious but perhaps less interesting than the gray, mustard-yellow, and orange lichens growing on the surfaces, or the sage-green mosses, bunch-grasses, and wild flowers that root in the cracks and flourish so unconsciously and so beautifully. They are usually frail-looking flowers—trilliums, wild geraniums, sweet peas, asters, lupines, pentstemons—with a gaunt look and a

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PLATE 15. BRIGHT ANGEL TRAIL, UPPER PART.
El Tovar Hotel on the Rim and Bright Angel cottages.

bleached coloring peculiar to desert vegetation; but they bloom and bear and sway in the wind as though they had a mission to fulfil and were happy in fulfilling it.

The vegetation decreases from the Rim to the River, but just under the Rim, where there is the wash of rains in wet weather, the growths are many. Some isolated specimens of the Douglas spruce are here. They grow below but not above the Rim and seem to flourish in the cool of the shadow. The taluses and slopes of the Kaibab harbor them almost everywhere along the South Rim. Some pinyons, nut-pines (*pinus edulis*), cedars also appear in Bright Angel, growing along the ledges, humming slightly in strong winds, bearing and dropping their cones and berries into the Canyon hundreds of feet below. The crested jays nest in these trees, as the cliff-swallows in the wall crevices of the Kaibab, but whether they drop their young hundreds of feet over the ledges I am not able to say. Apparently, both trees and birds are out of place, but they fight on, live on, and bring forth after their kind here as elsewhere.

More directly in the taluses and among the fallen débris of the walls are the wafer and flowering ash, the bush-oaks, the syringas, hollies, hackberries, with wild currant and gooseberry—bushes and tangles that increase wherever there is a little soil

and underground water to encourage them. The flowers, from the Canadian thistle to the smallest star-shaped species that lie low amidst the awns of the moss, grow wherever there is a bench of soil or a crack in the rock. The ferns, the spreading junipers that look like mosses but have a substantial tap-root, the many lichens are more tenacious. The black streaks that drip down the great walls and look like ink-stains will be found on examination to be merely flat beds of tiny black lichens, clinging in the waterway of the walls and gaining support from the occasional showers.

These strange growths, that in measure retard the processes of erosion, how they hold fast to the rocks and fight off heat and drought! They are not, strictly speaking, desert plants, but they have the desert instinct of self-preservation. They grow here in the dry air with morning and afternoon shade to favor them, but they are hardly native to the place, and their existence is always precarious. In fact, they pass out as you descend to warmer and more arid levels and the more positive desert growths come in.

Five hundred feet of descent and you are perhaps in a position to see the face-walls of the Kaibab and the Coconino. They are not seen to the best advantage on this trail, but even here how massive they appear in their bulk and how impressive they

are in their feeling of deep foundations! And look up at their height—their lift into the blue! Occasionally, as you are looking up at them, you may see their fairy continuation in the sky—thousands of feet of cumulus-cloud walls, piled high toward the zenith, and struck by the afternoon sun.

Here, too, is the opportunity to see the fluting of the Rim as it cuts against the sky. There is a marked regularity about it, especially as you move farther down and away from it and see it in more general outlines. You will notice also as you descend that the blue sky seems to fit in the flutings like an inlay of lapis lazuli. And, below it, as evening comes on, the rose hue of the Coconino shifts into a rose-amethyst. What wonderful colors!

After you have passed the tunnel—a few feet beyond it and at the left—you can see the line of faulting in the strata that made possible the Bright Angel Trail. It was this dislocation of the rock that invited the water-wear and resulted finally in the whole lateral canyon you are descending being cut back into the Rim. Below the tunnel you come to a turn in the trail where the light Coconino can be seen meeting the dark Supai. The sharpness of the demarcation, the evenness of the joining are astonishing when you think of the centuries that have gone to the original bedding, the subsequent upheavals, the pressures, the erosions. None of

these things seems to have greatly disturbed the beds.

The color change in the strata, from the pale salmon of the Coconino to the red of the Supai, can be noticed in the loose dirt of the trail as well as on the face-walls. The iron-rust in the Supai reddens everything it touches, even your shoes and clothes. The rock is a soft sandstone and shale, but only comparatively so. When you move down still lower and come to the steps or ledges of the Battleship you will perhaps think them hard enough. Those steps grow enormously in size as you approach them. And the higher slopes and terraces of the Battleship that from the Rim looked like places for a pleasant stroll, turn into tangled arroyos and washed-out canyons. Before the stroller reaches the turreted top he will have had a very rough scramble among bushes and boulders he never suspected were there. These slopes of the buttes are full of odd surprises.

Farther down on the left side of the trail and at the end of one of the zigzags you will be able to step out a few feet on a ledge overlooking a deep circus cut back into the Supai. A wall that can stand intact and support such a great weight is perhaps not so soft as we have implied. Terms at the Canyon are always comparative. This circus, for example, might be thought tremendous in

size anywhere else, but here there are many that go far beyond it. Yet how imposing and how beautiful it is! What a swing to the half-circle! What a space it encloses! The cliff-swallows and sparrow-hawks dash around it, but they are so small you do not readily see them. Occasionally a vulture sweeps through it on stiff wings and then up and out, but even he looks dwarfed. The space is really enormous. Picturesque? Yes, very; but for all its superb lines and splendid color, you would find difficulty in making a picture of it. It is too big.

The Canyon widens as you descend and the walls fall back, so that when you are on a level with the Red Wall the cliffs are quite a distance from the trail. The scoops out of the faces that, from El Tovar, look as though done by a sharp-pointed shovel working in soft clay, now appear as great amphitheatres. There are two of these at the right of the trail going down. One of them has an added recess at the back that seems almost as though designed for a stage. Over it is a colossal hanging roof hollowed out from beneath by rain and wind. Such a theatre might hold an army or a race. The mind refuses to think in thousands before such a stupendous enclosure.

At the foot of the Red Wall the Tonto begins, not in walls but in greenish-yellow taluses and slopes. There is a breakdown of these softer rocks

into graceful arroyos, rounded divides, and flat-backed platforms that dip gracefully toward the trail and toward the River. Here, too, the vegetation changes to something more desert-like in character. Mesquite grows in the dry washes, cactus and a false sage on the slopes, Spanish bayonet, yucca, and mescal along the trail. The Spanish bayonet, sometimes called soapweed, grows about two feet above the ground, has a foot of white flowers, and bears a fruit as large as a cucumber or a pear. The Indians dry it for food. The yucca grows ten feet in height and has often two or three feet of creamy bell-shaped flowers. Belonging to the same family is a still loftier growth, the shaft sometimes reaching up fourteen feet and bearing four or five feet of small yellow flowers, followed in season by yellow pears an inch or two long and round like a lead-pencil. This is locally called "mescal," but mescal is merely the Mexican drink distilled from its root. The growth is a variety of the maguey (*agave Americana*). In the old days the Indians used it for food, roasting the root of it in stone pits. The remains of the pits are still found in and about the Canyon.

A spring of water now comes to life beside the trail. Almost everywhere in the Canyon the water-line seems to coincide with Indian Garden on Bright Angel. That is, water if it comes to the

surface at all, is usually found coming through the shales of the Supai or under the Red Wall, though Dripping Springs in Hermit Basin comes from under the Coconino. Indian Garden is merely a small oasis brought into existence by the stream that runs through it. There is nothing remarkable in the fact that trees such as the cottonwood and the willow, with reeds, trailing grape, garden vegetables, and flowers should grow there. It would be more remarkable if they did not. Nor is there anything very romantic about the camp or its history. Undoubtedly the Indians once used the water to grow corn and melons, but of recent years the Garden has been in possession of white men, with miner's and squatter's claims as a basis for a prolonged quarrel among them.

At the Garden a side-trail branches off to the left on the platform overlooking the Granite Gorge, while the main trail goes on down to the River. The first-mentioned way branches again in less than a mile, one part of it leading off to the left and around under the walls to Hermit Camp. The distance to Hermit is something like twenty miles, and here the worthy mule may be resorted to without prejudice. The trip gives one an excellent idea of the face-walls and lower platforms (Plate 18). The slopes are very beautiful in both their lines and colors, the sparse vegetation is interesting in odd

growths of cacti and the false sage, the latter botanically referred to as "a rosaceous shrub" (*Coleogyne ramosissima*); and the rock shelvings of the Tapeats in the lateral canyons are fantastic, novel, often impressive in scale.

The Tonto slopes are not merely interesting trailways for the human but they are the stamping-ground for many wild burros that live down there and break the midnight silence with their brayings. They are only half wild and may be roped easily enough from a fast horse, though they are not to be captured afoot. A few mountain-sheep are still in the Canyon but they keep well up on the slopes in hidden pockets where they are not easily seen. The bighorn has a yellow-gray coat, stands still against yellow-gray walls, and even if he were directly before you, you would have difficulty in seeing him. Originally he was the first breaker and maker of the trails that run along the Tonto platforms, but the burro has usurped his pathway. The coyote, too, is here, running the slopes at night and sleeping under the rock ledges by day; but his living is not entirely satisfactory, and his tribe is not increasing. As much might be said for the yellow lizards with black collars, the coral snakes with white stripes, the side-winders, the horned toads (gray and pink, after their kind), and all the desert crew that creep and crawl. They are here but not in large numbers.

These platforms are rather hot barren spots. They break down to the Tapeats cliffs overhanging the Granite Gorge, which are hotter and even more barren. Occasionally some cactus or juniper or flower grows out of the crevices of the Tapeats or the Archæan rock, but usually it is short-lived. The Archæan had the life burned out of it many centuries ago, and it is now only so much fused splendor of color. One gets a good idea of its grim surface and twisted strata by continuing down the last lap of the Bright Angel Trail from Indian Garden (Plate 13). For those who do not wish to go down the Devil's Corkscrew to the River a good view of the Inner Gorge and the Archæan rock may be had from the Turtlehead or anywhere along the Tapeats cliffs.

The Hermit is the second of the important trails from the Rim to the River. It starts in at Hermit's Rest, half a dozen miles west of El Tovar, and may be travelled either afoot or by mule. The trail is something like eight miles from top to bottom, is not at all dangerous, and quite as interesting in its way as the Bright Angel. At the start it is an open trail, with no Douglas spruces, few bushes, and comparatively barren slopes. Small gritty stones underfoot in the zigzags of the trail testify to the hardness of the Kaibab and the Coconino. When the Supai is reached the trail not only changes from gray to red but the stones disappear in favor of loose dirt.

After entering Hermit Gorge, fifteen hundred feet down, the Canyon begins to narrow and the trail grows steeper. The Gorge itself should be followed back to one of its sources by making the side-trip to Dripping Springs. The trail there leads off from the Hermit Trail, before the Gorge is reached, and carries you to the head of a steep canyon where water drips from the Coconino rock. On the way to this spring one sees the great cut in the Supai forming the head of Hermit Creek. The Gorge lower down opens out into a canyon with a line of green trees and bushes in its bed showing the continued presence of water. This canyon is an excellent illustration of the erosive power of the lateral streams.

A sign "The Red Zigzags" appears. Here there is not only a fine view of the Red Wall across the valley but also down at the right a broad view of the Tonto formation with the waving lines of its platforms. Notice should be taken of the reds and greens in the little butte just beneath you and the superb lines of the high buttes across the River, especially in the taluses that sweep down in long curves to the little valleys with their dry stream-beds. A thousand or more feet above Hermit Camp the trail turns east under a huge red cliff of Supai, and at the base of it is an outcrop of violet shale very beautiful in color.

At Cathedral Stairs the trail runs through a mixture of Supai and Red Wall. The latter lies straight

From a photograph, copyrighted by Fred Harvey.

PLATE 16. HERMIT TRAIL, RIVER END.

Through Tapeats sandstone. Camp middle distance. Pima Point against sky.

ahead, and its staining from the Supai above it is quite apparent. Around to the left, connected by a thin ridge, is a promontory of Red Wall called Cope Butte that is fast being cut away from its parent rock (Plate 4). You will notice that its color is not red but mouldy salmon with something of greenish-gray in it. There is no Supai bed above it to stain it, and something of its blue-gray local color has begun to come back to it.

The trail winds on and away from the wall, out on the long platforms of the Tonto. Hermit Camp is located on one of the Tonto platforms under the lea of a high protruding promontory called The Lookout (Plate 22). The view from the camp is commanding. Across the River the buttes and the Rim rise like mountains—a little like the Dolomites. The Red Wall to the west, with the Supai, Coconino, and Kaibab strata atop of it, is magnificent; while to the east is a huge amphitheatre in the Red Wall along the roof of which runs the trail you descended, and above which rise in majestic flights the giant steps of Pima Point.

The Tonto platforms, in rolling ridges, are all about you, their wonderful yellow-green coloring showing to advantage in a steep bank directly back of the camp. Little vegetation appears on these platforms aside from cacti, the maguey, Mormon tea, the false sage. In the Hermit Creek bed to the west of the camp there is the usual tangle

of ash, willow, mesquite, wild grape, tules. The creek itself is a small trout-stream but with no trout. Originally there were beaver in it (as also in the Colorado), but there are no gnawings or chippings of trees to indicate their presence to-day. It is an innocent-looking stream, but when it turns red with cloudbursts it churns and thunders like a cataract. You can follow its course to the River for a mile below the camp and all the way down, through the stiff Tapeats and the harder Archæan wall, you can see how it has ripped and torn its way, making gorges, small canyons, caves, and waterfalls, apparently with no effort whatever (Plate 20).

The stream is widening its course below the camp, but if you follow it back in the strata for a mile you will find a narrow deep defile in the rock where water in flood boils and seethes, and rocks are rolled and battered against the walls as violently as in the Granite Gorge (Plate 6). In summer drought there are sections of the creek that are quite dry save for pot-holes or catch-basins in the rock that hold stagnant water. Birds come down to splash in these shallow pools, and snakes lie in wait beside them for the birds, and wild burros kick at the snakes and paw at the blue-green waters. They are not still waters beside which one wishes to camp and cook. Water, of any kind, is always more or less of an oddity in desert lands, but the caught pool soon becomes an offense.

To the east of Hermit Camp a trail runs over the ridges of the Tonto into the basin of Monument Creek and thus around to Indian Garden on the Bright Angel. The views that one gets in and about Monument Creek and its upper drainage area, called the Abyss, are well worth a day's journey in the wilderness. The breadth of the basin, the amphitheatres, the lift and wind of the walls, the creek-bed that cuts through the Tapeats and the Archæan, are all superb.

To the west of Hermit Creek there is a continuation of the trail whereby one passes over into Boucher Creek and beyond. It is possible by following this rather blind trail to worry along the slopes of the Tonto down to Bass Ferry, or, for that matter, to indefinite distances. The slopes lend themselves readily to exploration. And they become more interesting as the trail fades out. The vegetation does not materially change, but the animal life increases and the primeval quality of the landscape, the remoteness and aloofness of it, grow apace with the distance removed from hotel and camp. Nature undefiled always lies rather far afield.

CHAPTER IX

OTHER RIVER-TRAILS

THERE are a dozen trails down to the River from the South Rim, but the hotel talk revolves, almost exclusively, about Bright Angel and Hermit. The mule and the guide are easily obtained for these well-worn ways, but there is little enthusiasm or eagerness about a trip down Boucher or Bass or Hance Trails. The going is not so good, they are some distance from El Tovar, and, after all, the mule has his rights, that should be respected. But mules are to be had, and guides, too, if you insist. You can also get along quite unaided of either if you are so minded.

The Bass Trail is thirty-two miles to the northwest of El Tovar and can be readily reached by wagon or automobile. It is a miner's trail and much narrower and rougher than either Bright Angel or Hermit. Occasionally it goes blind or is confused with side-windings made by wild burros. In following these faint trails one should look twenty or thirty yards ahead and get the general run or trend rather than spend time over hoof-marks or discolorations of the soil.

From the Rim in front of Bass Camp the trail

descends by long zigzags. You do not creep down them, as a fly down a diagonal crack in a wall, but walk upright as upon any other hillside pathway. It is not at all hazardous, though it may be a trifle lonesome. A thousand feet down you cross the Darwin Plateau. Carved through this rock platform is a deep gorge that causes one to stare. It is usually dry—an empty channel cut in the rock —but with a cloudburst one can easily imagine it a roaring torrent. The huge boulders in the bed, some of them weighing twenty tons or more, give suggestion of the pushing power of water. Beyond it one reaches the foot of Mt. Huethawali—a conical butte the Supai base of which spreads out and down in taluses beautifully waved and fluted. If you follow around this butte you will find it belted by drainage streams that originally cut it away from the Rim. On the River side of it a hazy trail leads off across Spencer Terrace to Fiske Butte.

The walk of a mile or more along Spencer Terrace is over flat Supai rock, pitted with round holes, where shallow catches of rain-water stand and grow green, and where more boulders weighing tons seem to have been rolled out and abandoned by a race of giants. Here and there, from thin cracks in the rock, grow grasses, two or three varieties of the maguey, yucca palms, dwarf pinyons; but there are acres and acres of the red floor where nothing at

all grows. The fall of the foot upon it, the dull iron sound of it are strangely impressive. As you travel on you appear to be drifting far away from humanity, from civilization, from the modern world. The rock under you seems very ancient and yet not old enough for a livable world. Soil has not yet been ground from it; the globe is only a ball of impure metal, and the Carboniferous age has hardly begun. In spite of geological chronology you feel as though you might, by looking about you, see some monstrous lizard a hundred feet long lying at length in the sun, or some sabre-toothed tiger creeping out of a sandstone cave. It is a lonely, silent spot where not even the Pre-Adamites seem to have place.

As you go down to the extreme point of Fiske Butte overlooking the River (an ancient Canyon-lover has named it Montevideo) the loneliness suddenly turns into frightfulness. At the left, directly under your feet, is a true-enough precipice. It drops for I know not how many hundred or thousand feet. The thought of it makes you uncomfortable. There is another drop, at the right—another precipice. You seem to have crept out on a spur of rock into space. Over the extreme point of the spur, looking down, is the turbulent River. The roar of it, the sway of it, the reel of the great depth itself make you giddy. You back away. The view is magnificent but too aeroplanic for pleasure.

From a photograph by W. F Sesser, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 17. HERMIT TRAIL, NEAR GORGE.

Creek Canyon at left, Red Supai formation above.

There are terraces, similar to the Spencer, at the west; and others to the east, called Huxley Terrace and Grand Scenic Divide, that afford superb outlooks upon the Inner Canyon and the buttes across the River. A great bend in the Colorado comes in just here and the character of the Canyon scenery begins to change. West of the Divide the buttes go out, the promontories grow longer, the Canyon flattens in depth and becomes somewhat less imposing in grandeur. But you are not made very conscious of this from where you stand. All the terraces within view are much alike in their rock floors, their flat reach, their precipices, and their feeling of remoteness.

The Bass Trail continues down to the River from the head of the steep canyon between the Divide and Mt. Huethawali. The descent is rapid and somewhat more exciting than at Hermit Creek but not nerve-racking. Like every trail in the Canyon it abounds in quick turns, strange surprises, astonishing walls, superb vistas. After passing down the Tonto slopes there is another quick descent to the Colorado, where at one time a suspension ferry with a cage running on a wire carried general plunder across the River. It was a part of a mining enterprise, and of recent years has been operated only sporadically.

From the Tonto there are dim trails leading to the

east and west across the slopes and around under the Red Wall. They lead on indefinitely. In fact, the whole length of the Grand Canyon can be traversed on these Tonto slopes that flatten out under the great walls. The place is not so inaccessible as it looks at first blush. You are told of two or three trails and given to understand that beyond them there are no thoroughfares. But the understanding is misunderstanding. There are many trails that the average person can travel on mule-back, and many others where an expert climber properly shod can go with little danger. The danger lies in wearing heavily nailed boots, pigskin puttees, fashionable khaki; and in burdening oneself with water-bottles, lunch-boxes, opera-glasses, and revolvers. They are all unnecessary on a six or eight hour trip. One should dress in cotton shirt and light trousers, wear rubber sneakers in lieu of moccasins, and carry a thin eight-foot alpenstock. You are then prepared to depart from the trail, vault crevices, travel foot-sure along the edge of precipices, or creep around narrow points and ledges. As for food and water, any athlete or Indian will tell you that you can travel better without them. They are good things at the end of the trip but not at the beginning.

The only other trail (on the map) to the west of El Tovar is the Boucher, that starts in near Dripping Springs, goes down the west side of Hermit Creek,

and winds around under Yuma and Cocopah Points to the River. It is a difficult trail and one that has bad spots for both man and beast. Few people go down it, so it need not be described.

To the east of El Tovar there are at least three well-known trails. The nearest is that at Grand View. In common with the other Canyon trails this one is the result of copper having been discovered under the Supai slopes. The remnants of a copper camp are still down there, and the riprapped trail still suggests the one-time burro pack-train. It is in fair condition, though little used. There are some sharp rocky descents but they are not perilous. The trail should be taken directly in front of Grand View Point. Nearly a mile back, on the road to the point, a sign indicates that the trail starts on the right of the sign. It should be disregarded. That is the head of an old trail which is now abandoned, filled with slides of stone and crisscrossed by fallen trees. It is not possible to go down it on a mule, and even afoot there are places where it leads around the edge of precipices decidedly disconcerting to the inexperienced. After a mile or more of rough travelling this old trail comes out and joins the new trail, which leads down directly from the end of Grand View Point. There is nothing gained by taking the old trail except a possible fright from worrying around steep walls.

The new trail is steep enough—much steeper than

Bright Angel or Hermit. There are several descents along the walls of the Kaibab and Coconino so abrupt that discretion may suggest getting down and out of the saddle. The trail falls rapidly, turns sharply, winds under huge cliffs. Five hundred feet down a fault between the Kaibab and the Coconino makes possible the crossing of a saddle where there are not only distant views in both directions but excellent near views of the cross-bedding in the Coconino. A thousand feet under the Rim the transition from the Coconino to the Supai is not only sudden but dramatic. The trail crosses another saddle, and a view of Grand View Basin appears framed up between towering walls. The most rugged and striking scenery of the Canyon appears here. If it were not for the coloring you might fancy yourself in some pass of the Tyrol. Farther down, the trail winds along ledges of the Supai and gradually flattens out as it descends to the Horseshoe Mesa. From thence on you are in open country, the high walls are behind you and platforms and terraces are ahead of you. Before reaching the mesa you pass through the old copper camp with its deserted buildings—interesting for its wrecked hopes and general air of failure rather than for its picturesqueness.

A trail runs off from the east of the camp and leads down to the River; but there is more to be seen

from the points of the Horseshoe. For there one gets a sweeping view all around the circle, no matter which point is chosen for observation. Looking backward is impressive for the magnificence of the cliffs; looking north across the River to the buttes and promontories of the North Rim is just as impressive, for now you seem to see a mountain range with foot-hills—desert mountains with their splendid warmth of color. The buttes apparently pile up at the back until the Kaibab on the North Rim seems the central ridge of the range. There is a wonder of grandeur in these stepped heights reaching up into the blue of heaven. And this is only a part of the scene.

Standing on the west point of the Horseshoe one sees the lower slopes as perhaps nowhere else in the Canyon. They seem broader, flatter, more spacious than at Hermit or Bright Angel. Their curving outlines, their waving contours, their great recesses and sweeping taluses show undulations such as one seldom sees in the earth surfaces. The southern sea sometimes heaves and rolls like that, but with less length of converging lines and less variety of color. Nothing grows on the slopes but the pseudo-sage that dots the surface and perhaps emphasizes the jade look of it; but was there ever a more wonderful piece of color! It is not high in pitch; on the contrary, it is almost monotone and yet is stimu-

lating because of the great mass of it and the splendid sweep of it. Line and color supplement each other here.

Under the west side of the Horseshoe is a limestone cave, a hundred or more feet in length, where one may see stalactites hanging from the walls and ceiling, but it hardly calls for a visit. On the east side are tunnels and shafts of the old copper-mine, but these, too, may be profitably skipped. The world in the sunlight seems more worth while than these merely curious depths in the earth. Besides, both the cave and the mine can be seen in better examples elsewhere.

Across from the points of the Horseshoe is the wall of the Inner Canyon—the old Archæan rock. It is not less grim here than at Bright Angel. The chaos of its mixture, the dead desolation of it, the poppy purple of the coloring make it uncanny; and wonder not unmixed with apprehension goes along with each new view of it. There is a feeling of fire and fusion, as though all the beds and minerals had been stirred in a huge melting-pot and finally flung up white hot and allowed to cool as slag. And through these purple walls the pour of the swift, the red, the roaring River!

The trail winds on down the Tonto slopes of the west point, down to the water. You may not be inclined to follow it to the end. The better views are

from the higher platforms. Moreover, such animal and vegetable life as exists here is seen on the upper terraces. But there is little life at best. The burro and the jack-rabbit occasionally break away through the thin brush, but the lizard and the horned toad under a rock, with the side-winder under a cactus, are the real natives of the soil. One hears the jangle of the jay in the scrub-cedars or pinyons, and at night the mournful call of the poor-will—neither of them soothing sounds. Occasionally, too, the vulture—that jackal of the air—slips across the Horseshoe, exciting wonder for his masterful sailing, and at evening bats and owls come out of the caves seeking what they may devour. But none of the crew could be accounted pleasant company. All life down here is a bit savage or gruesome. And by the same token the lower slopes are weirdly wonderful in form and color but not places for a long stay. One gets back to the Rim, where the cliff-rose is blooming, where the smell of the yellow pine is on the breeze and the note of the robin in the air, with a feeling of relief.

To the east of Grand View about two miles is the old Hance Ranche, and a mile or more farther east one strikes the Hance Trail. It goes down Red Canyon to the right of Coronado Butte, but as no one seems to have used it since the hope of mineral wealth died out in the Canyon, it is not in very good

condition. The only footprints I discovered in it in the summer of 1918 were made by wild burros. Any one can go up or down it, for it is passable, but it is not more interesting than other and smoother trails.

Beyond the Hance to the east there is no open trail until Lincoln Point is reached. This is two miles to the west of Desert View, which is to say, some thirty miles or more from El Tovar. There is a good automobile road the entire distance. The trail-head is a little blind. It is about two hundred yards east of the point and is to be found by following the Rim.

This Lincoln Trail is not very broad. Perhaps originally it was a runway made by deer going down from the Rim to water. It is, if I am not mistaken, the old Tanner Trail, and was perhaps known to Major Powell when he came through the Colorado canyons. In 1918 I could find no trace of anything in the dust of it but the hoofs of deer and the pads of coyotes. No one had been over it for a year or more. Now that the travelling public is beginning to recognize the eastern as the most picturesque end of the Grand Canyon, this trail will no doubt come into more use. It is not a difficult descent, and has its attractions, though it is behind Grand View in walls and behind Bright Angel in general interest. The Kaibab is not so thick in strata here as farther west, the Coconino

is much tilted and broken in its cross-bedding, and the Tonto flattens down into wide-rolling terraces.

Aside from the caves in the walls and some Indian pictographs on boulders in a dry bed at the right of the trail, there is little to note until one reaches a level ridge or hogback crossing a transverse valley some fifteen hundred feet down. The trail follows across this red ridge, which is now the divide between an eastern and western valley. This divide is being cut away, and eventually will disappear, leaving the great bench ahead separated from the main southern wall. It is another case of butte-and-promontory making in process, and how savage the process you can see by looking down at the left into the chasm which has already been cut out of the rock.

After crossing the red divide there are two or three miles of winding around the Supai slopes. Seen from the Rim the trail seems to lie flat, but the traveller down there finds that it has its decided ups and downs. It is over a desert bench or platform that grows dwarf cedars, yuccas, Spanish bayonets, cacti, sage, bunch-grass—all of them flushed in coloring from lack of soil and moisture, and from perhaps some copper in the shale. The platform seems isolated and rather devoid of animal life, though there are traces of deer and coyotes here and there, with birds such as the horned lark,

the dove, the jay, the flicker. As for snakes, horned toads, and lizards, they seem much at home on the red shale and under the magenta-colored cactus.

This platform has deep canyons on its south and east which break out to the River, leaving the platform itself standing with perpendicular cliffs. At the edge of it looking south you are facing a portion of the Red Wall, above this the Supai shales shelve down in long slopes, and still higher the Coconino and the Kaibab—the former much cross-bedded—join with some confusion. To the east Comanche Point comes out at you like the prow of a colossal battleship, and to the left of it, stretching beyond the mouth of the Little Colorado, is a parapet of cliffs known as the Palisades of the Desert. Very majestic is this parapet, with its high lift, its long sweep, its feeling of strength and endurance.

But the impressive view here, before you make the final lap of the trail, is from the cliff directly overlooking the River. You go out across rolling slopes to the edge, where you meet with a swift drop of perhaps a thousand feet. You are atop of the Red Wall and the drop is into a pot-hole made up of shelving slopes of the greenish Tonto and the raspberry-red beds of the old Unkar. The color of this basin is most astonishing! Maroon marls, fire oxides, jade greens appear everywhere. And these are woven into and across slopes with lines

From a photograph by E. A. Lane, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 18. ON TONTO TRAIL.

Cactus, mesquite, and false sage-brush in foreground.

dipping swiftly downward to the bottom of the basin. The look over the edge is fascinating but also somewhat fearsome. There is something about the pit that suggests fire and brimstone. The cold crater of a volcano is less indicative of Nature's internal fires than this beautiful bowl in the Canyon.

The inner walls of the Granite Gorge break down and run out just here. On the north side all the strata have a dip or inclination to the southeast, and following that dip the old Archæan walls eventually disappear. The first impression is that the River has risen, but, on the contrary, it is the strata that have fallen.

The River is finally reached by the zigzags of the trail down and over the shales of the Tonto. When you come close to it the size and movement of it give you something of a surprise. It makes sharp turnings here, is flung against perpendicular walls, is shot over huge bed boulders, and is churned into yellow foam. Farther up, looking toward the mouth of the Little Colorado, the stream runs in the open for some distance. It is a rapid stream everywhere, though there are stretches of it that lie flat and smooth, and in the late afternoon when the sun is low, these stretches are not sand-hued but show a terra-cotta or a Venetian red. Perhaps the Spaniards, seeing that flush, named the stream Colorado —that is red, or reddish.

Two miles to the east of Lincoln Trail is Desert View. A comfortable camp has recently been established there. From this camp it is possible to make excursions on the Painted Desert, along the Palisades, and (by crossing the Little Colorado) to the Marble Canyon and beyond. You will be told at the start that there is no trail and that you cannot get around to Comanche Point except by going back in the forest several miles and taking an old Mormon wagon-road. But you need not mind either the road or the information. Follow the Rim to the east and you will come out on the Comanche Point side of the Canyon in less than an hour. Before you reach it an old wagon-trail indicates that you can go over to Cedar Mountain and from there to the cliffs of the Little Colorado. The trip on foot from Desert View to Cedar Mountain is two hours and from thence to the Little Colorado two hours more; but to descend and cross the Little Colorado you must go farther to the southeast and pick up the Mormon road. That is the only accessible route to the main stretches of the Painted Desert and the Marble Canyon.

Between Desert View and Cedar Mountain there is a nebulous trail leading down into the Canyon as far as the top of the Red Wall, but whether the entire way to the River, I am not able to say. It is a deer-run and not the kind of trail the average visitor

cares to travel. The animals living on the Coconino Plateau in the heat of summer must have water occasionally, and there being none on the plateau they go down to the River, following the dry beds of pitching streams. The result is the deer or sheep run that in time becomes a burro-trail, and in the latest stage a mule-trail for tourists.

Eventually, no doubt, the enterprising capitalist will put up a funicular or aerial railway that will drop people into the Canyon in fifteen minutes, but for the nonce the picturesque trail is the only way to the River. It is to be hoped that it will always remain to worry the indolent and make glad the heart of the wilderness-lover.

CHAPTER X

THE COLORADO

It seems rather odd that looking over the lip one cannot see the inside of the cup, that standing on the Rim one cannot see into the Inner Canyon. From certain outstanding points one hears the River's voice and knows that it is cutting and grinding down deeper and deeper into its Archæan bed, and from other points it appears in spots and flashes; but it is at best an evanescent, a hidden, river. From El Tovar it is not seen at all.

Down at the Turtlehead, or elsewhere along the Tapeats cliffs, one gets moving-picture views of it in elongated sections. It is just below you some twelve hundred feet, runs fast, and flashes much. Its roughened surface and its rumbling shock say that it is a river of might, but even now you do not comprehend the force of it. You should go down and stand beside it at the mouth of Hermit Creek. That is the most accessible place for the visitor and also one of the most impressive in the Canyon so far as the display of power in the water is concerned.

The trail down from Hermit Camp follows

through deep gorges of Tapeats sandstone much eaten into by wind, rain, and flood (Plate 20). It is not long before you meet with a change to walls of Archæan rock, with strata twisted and bent at every angle (Plate 16). The creek has cut through these rocks on its way to the River, but just now it is a mere babbling brook. You soon lose the babble in a hum that keeps increasing as you descend. Presently you debouch at grade rather unexpectedly. The tossing River is before you, and the shock of it in that narrow canyon is almost like that of Niagara.

It is not very wide and apparently not very deep, but how it does pitch and leap and surge and swing! The downward sweep of it is not greater perhaps than you have seen in other rivers, but somehow there is a feeling of weight to the water here. You may be a strong swimmer but you would not like to trust yourself in that current. Even in a strong boat there would be distinct perils. Why is that? What is it that suggests abnormal push, fierce unrestrained power in the water?

The local color of the stream in the month of June is a precise *café-au-lait.* The foam tips and the spread of white froth along the shores even give the effect of whipped cream on the coffee. What makes this color? Surely the sand and silt carried in the water. It is both sand-colored and

sand-laden. And that not only gives it the appearance of having weight but is weight in itself. Liquefy the layers of the Coconino sandstone and set them in motion and you would have an approach to the Colorado. It moves with a force out of all proportion to that of the Mississippi or the Columbia or the Yukon. The great power of it, especially when swollen with rains, is appalling, startling, even frightening.

At the mouth of Hermit Creek, where you come out, there is swift water. The creek has thrown huge boulders into the River just here, has cut a deep trough in the channel, and lodged some of the largest of the boulders amid-stream. Above the rapid the water appears quite calm, but it moves in volume with a slipping slide that makes you just a little giddy if you watch it for a few minutes. In places it has a whirling spiral movement that is just as bewildering. It runs for no great distance before it begins to twist and writhe. And you may notice that, even when quite smooth upon the surface, the stream is higher in the middle than at the sides. As it moves down the heap-up of it in the middle increases. Before meeting the uneven boulder-bed at the creek mouth it has a trend and a tendency toward the right. It swings over to the shore opposite the creek entrance to get around the boulder-bed. Some of the water passes down

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PLATE 19. GRANITE GORGE.

Colorado River running through Archæan rock.

that way in a rapid swirl but other portions of it begin to plunge over the boulders.

If you study water rushing over a boulder you will notice that it plunges down with a swift curve. The heavy under-water moves so fast that the lighter top-water cannot keep up with it. The footing is cut out from beneath it by the under-water and it falls, or seems to leap back up-stream, as a crest of foam. If the oncoming water meets a boulder broadside or collides with another body of water, there is a sudden push up of dancing points or jets. These crests and jets are sometimes flung ten or fifteen feet in air and then collapse with a great splash. The splash, in turn, sets waves in motion that swash up against the walls and along the boulder-lined shores.

The waves of a rapid have forms that apparently stand still in the stream. The water itself moves, but in such perpetual flow that the waves are never allowed to subside or disappear. A boat going over the waves follows the rush of waters, rising over ridges and sinking into hollows. When the boat meets a wave so high that its crest seems to leap back up-stream then there is danger, especially if the boat moves broadside instead of bow on to the wave. The craft may wash full of water or capsize. This is one of the dangers that has always confronted the River navigators. Dellenbaugh

states that the Sockdolger Rapid has waves from twenty to thirty feet high.* Imagine plunging at such a water-ridge with a sixteen-foot boat!

The water that rushes over and down the back of boulders into sunken pits in the bed comes to the surface again farther on in boiling geysers—circles from a few inches to ten feet in diameter that surge up from below as from the depths of a caldron. They flatten down and push out waves that, again, beat and sound on the rocky shores. Their bubble and their boil with their swish and swash add to the great roar. All of them mingle with a vast undertone that seems to come from beneath the River's bed—a sound like that of rolling stones over an iron floor. At times it is hollow and rumbles with a suggestion of the volcanic—a suggestion enhanced perhaps by the enclosing walls of fire-rock.

How far removed is this River roar from

> "a noise like a hidden brook
> In the leafy month of June
> That to the sleepy woods all night
> Singeth a quiet tune!"

As you stand there by the shore the jar of it makes the rock you are standing upon respond with a half-shiver. The thunder goes on and is echoed and re-echoed from the upright walls of the

* Dellenbaugh, *A Canyon Voyage*, p. 226. New York, 1908.

gorge until the whole depth becomes choked with sound that cannot get out save by rising straight overhead.

Why should it cause one fear? What is there in mere sound to make one tremble? You laugh at the idea, and yet after a few minutes it comes back at you like a gadfly. The roar produces entirely too much bombardment to please either the senses or the nerves. The rapid water is fascinating to watch for a time, but the hurly-burly of it will disturb the poise of all but the most phlegmatic. Powell and others who went through the canyons by boat grew very weary of it notwithstanding many rests in the quiet reaches of the stream.

The shock of sound seems to grow more intense after dark. Perhaps you have gone down to Hermit or elsewhere on the recommendation of some enthusiast to see the River by starlight, and think to sleep in a warm sand-pocket under the Archæan wall. But you can no more sleep there than in a steel-mill. The clash of waters becomes a hideous din. In the middle of the night the stars go out and a thunder-storm comes up. You make a shift for shelter, clambering in the dark along the wall seeking some overhanging ledge. By accident perhaps you find a shallow cave, strike a match, and have a look around for snakes and scorpions. A few bats flutter into your retreat and cling to the

ceiling. You settle down and so does the rain. Blinding flashes of pale-violet lightning explode before you and illumine the gorge. The crack of the explosion follows instantly. Was there ever such a furor of sound! The echo of it does not die out but seems to mingle with the roar of the River; or, to put it differently, the persistent roar of the River seems punctuated by crashes of thunder. One can imagine nothing in Nature's sounds more shattering to mental aplomb.

The Hermit Creek rapid is not an unusual or exceptional illustration. Wherever a creek or a dry bed of any size comes out and joins the Colorado, there you will find the swift current. The creek flings its carry into the River and a dam of boulders results, with its consequent collision of water. There are scores of these creek entrances in the Grand Canyon and hence scores of rapids. An additional one occasionally appears owing to the presence of some cross strata of crystalline rock in the bed. No wonder the explorers met with many disasters in trying to descend the stream. The River is still unnavigable. It still holds men back.

In the stages of high water the fury of the torrent is greatly increased. The Colorado cannot expand and overrun its banks like the ordinary stream. It is held within iron walls that are in places twelve hundred feet high. All that the water can do is to

From a photograph, copyrighted by Fred Harvey.

PLATE 20. HERMIT CREEK, LOWER REACH.

Gorge through Tapeats rock, trail at left. Camp central. Red Wall at back.

rise on the walls and in effect deepen its volume. The marks of it show plainly enough that it sometimes reaches a stage sixty feet above normal. The rush of it then is almost unbelievable.

At its lowest stage in October or November the water often clears up in color and becomes, as Captain Dutton describes it, "a pistachio green." The rapids then subside somewhat, and in places, such as that opposite Desert View (Plate 33), the River smooths its wrinkled front and slips along with measured calmness. But this summer face is only a temporary appearance. Usually there is a mad rush of waters through a trough of fire-rock, and nothing can greatly modify either its madness or its might.

It is a splintered waterway where the Colorado runs, and perhaps some of its sharpness is due to its geological newness. As already suggested, the Canyon is of comparatively recent origin. It was probably started in the last period of Tertiary times —that is, the Pliocene—or perhaps even as late as Quaternary times. It lacks the smoothness that comes with age. Erosion and corrasion—the mechanical wear by friction and the chemical wear through solution—have flattened the bed of the Hudson and washed down its walls into rolling slopes, but the Colorado is still canyon bound, hanging in the rock, cutting down to sea-level (Plate 19). And

its water is still running red with oxides of iron and copper, keeping pace with those torrential streams

"Whose foam is amber and their gravel gold."

It is this newness, with its sharpness of tooth and claw, that adds greatly to the River's savage mien.

And to its loneliness. From its rise in the Wind River Mountains of Wyoming to its debouchment in the Gulf of California it is a lonely River. There is no city at its source, nor at its mouth, nor yet again along its length. Yuma and its kind, perched on a bench in the desert, seem as much out of place as might a town in the depths of the Canyon itself. The River knows no cities. For seven hundred miles it is not bridged nor navigated nor mill-streamed nor utilized by mankind. It goes its lonely way.

The utilitarians look at it and perhaps wonder how they can harness it, make it turn wheels, generate electricity, or irrigate the earth. It now serves no "purpose" and is quite "useless"—useless to man, who still cherishes the idea that the world was made exclusively for him. But Nature works alike for the animate and the inanimate. The Colorado is one of her best cutting instruments. She is using the River to grind and carry away the rock of the Plateau Country. She is laying it down in beds of sand and silt in the Gulf of California, and in the fulness of time she will heave it up into

a new plateau for use in a new world era. Is that not more important than being a present trunk sewer for foul cities, a fetch and carry for mere man?

The River is only one of the many agencies of the great law of change—change whereby the world is renewed and kept virile and living. It is an elemental force and perhaps too remote from human endeavor to be rightly comprehended. We test it by intellectual or economic standards and find it a great unconformity, an anomaly, an extravagance —something incomprehensible. We try to utilize it but it defies us. We think to make application of it in art and literature, but it does not respond. It is not classic, romantic, realistic, or cubistic. We can do little with it.

All the poems and purple patches of prose written about it are but so many elongated exclamations. The only poem that, in measure, suggests the spirit of it was written a hundred years ago by one who probably never so much as heard of the Canyon:

"In Xanadu did Kubla Khan
A stately pleasure dome decree
Where Alph, the sacred river, ran
Through caverns measureless to man
Down to a sunless sea.

* * * * * *

And from this chasm, with ceaseless turmoil seething,
As if this earth in fast thick pants were breathing,

A mighty fountain momently was forced,
Amid whose swift half-intermitted burst
Huge fragments vaulted like rebounding hail,
Or chaffy grain beneath the thresher's flail;
And mid these dancing rocks at once and ever
It flung up momently the sacred river."

Something of the power, the remoteness, the weirdness of the Colorado are unconsciously hinted at in Coleridge's poem, but no more. It is not realization—not the final truth. In spite of every suggestion, explanation, and representation we still grope along the twisted rocks of the Inner Gorge in amazement. Smaller things may distract our attention for the moment—a barrel-shaped bisnaga growing out of a crack in the rose granite, the powdered sands in a cove water-waved in astonishing curves, a lone kingfisher sitting on a rock surveying the thick stream where he could not see a fish if one were there—but we keep coming back from the incidental to the fundamental. The purple walls draw us, the racing River keeps roaring a fanfare in our ears. Just a little of the fear and the impulse that we first experienced at the Rim are with us. We are not accustomed to this clash of elements. Wind and storm and lightning are an old story, but the mad plunge of a canyoned river is something unique.

Everything here in this strange river-valley is

novel in experience and, as a result, stimulating to the imagination. One is continually with nerves on edge, with sensibilities stirred by sensations. It is not a restful place, for all that Nature's repose is so supreme. Least restful of all places is this Inner Canyon where the River runs and the Plutonic walls rise into sharp edges and needles. In vain the eye seeks the long, flowing line that rests it. In its place you have the broken and the angle line, the teeth of the rip-saw, the ragged spine.

Presently you leave them and go back to the slopes under the Red Wall. It is a relief to get away from the shock of sound and the giddy slip of the water. Even one's amazement must have a rest.

CHAPTER XI

NIGHT IN THE CANYON

THE traveller who delights in the panorama, the long-distance view, may be disappointed in the Canyon depths. Descending any one of the trails is very like going down into a narrow Alpine valley, say at the Maloja, or Lauterbrunnen. The field of vision at once begins to lose in breadth, width, and height. The distance across is from cliff to cliff, the Rim becomes the horizon circle, and the great vault of the sky shrinks to a blue roof upheld by walls. More astonishing than anything else is this apparent sinking of the sky. It seems to drop into the flutings of the Kaibab and stretch across from north to south. The blue is, of course, merely the coloring of a deep bank of air, but perhaps we fail to reckon with the air following us down into the Canyon.

All this is apparent from the Tonto slopes, but it becomes more emphasized as you descend into the Inner Canyon or Granite Gorge. You are then hedged in by dark walls on the sides, with a reddish-yellow strip of river below and a corresponding blue strip of sky above. You are in a box—a box

canyon. The light there is not wanting in illumination, but its effect is perhaps lessened by much shadow from the high walls. "The gloom of the gorge," however, is a rather exaggerated phrase. With certain portions of the inner walls there may be the darkening that one sees in the narrow canyon street but no "gloom"—at least not in the daytime.

At dusk it is different. The gorge banks full of purple and violet shadow as soon as the sun has gone down, and when night has set in it becomes densely dark, fathomless, formless. The only light comes from the sky overhead—the ribbon of sky that now takes on a night blue and is spangled with stars. The stars seem near, and the illusion of their nearness is helped on, perhaps, by their being seen at dusk from the gorge just a little before they are seen at the Rim. Stars from the bottom of a well and from the bottom of the Inner Canyon have a similar appearance. They are not visible from either place at noonday, but at dusk the well and the wall cut off the side-lights and thus make visibility greater overhead.

The Inner Canyon is hardly the place for full-light effects. The Tonto slopes that offer some little perspective are better, and Hermit Camp on the Tonto is a comfortable quarter from which to study the play of light at any and all hours. The study

calls for an almost continuous looking up. The walls are the places where sun and shadow fall, where twilight fades and moonlight gathers. And walls are all around you at the camp. They are continually responding to different phases of light, but the western light at sunset is about the only one that catches the average visitor's eye.

At this hour the high buttes across the River from Hermit (Plate 21) often appear with almost iridescent surfaces. The westering sun throws down and along the Canyon its reddened beams, striking the tops of the buttes and turning them into hues of gold, of rose, of lilac, of violet. The most unbelievable tones and shades are then registered on these barren rocks. The Red Wall and the Supai are the first to kindle, and frequently they are aglow with intense reds before six o'clock. Naturally they are the first to lose the light and settle into gloom, while above them the Coconino and the Kaibab are still flushed with rose and pink. After the sun has gone down the hot twilight sky illumines these upper strata with golden or reddish or sometimes violet light. They are then at their height in quality of hue.

But the lower bases in the dusk are very impressive even when indefinite. And they are seen on our side of the River as well as elsewhere. The Lookout (Plate 22) directly back of Hermit Camp

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PLATE 21. FROM CATHEDRAL STAIRS, LOOKING NORTHWEST.
Granite Gorge in centre, buttes in sunlight, maguey plant in foreground.

shows them to advantage. At first the contours and outlines of the high point, seen against the bright upper sky, are clean-cut. The prow rides into the blue with every niche along its edge, every pinyon and maguey growing on its top, every field of lichens on its upper walls, showing distinctly. Gradually the dusk drifts in and around the bottom platforms, it creeps up the huge western wall, the light slowly recedes before it. The base begins to fade, the top begins to loom, and presently the whole structure shifts into a color mystery half lost in shadow. The dramatic and the spectacular mingle with the picturesque to make an astonishing picture.

The same effect shows upon the great walls underlying Pima Point (Plate 16). The bases become muffled in pinkish purple and the tops seem to drift against the blue as surfaces of reddish orange. Even the near Red Wall begins to develop some unrealities. The lighter portions sink back from the surface; they are the places where rock has recently fallen away. The darker and older parts of the surface come forward with their field of lichens and look like torn fragments of velvet tapestry. The Tonto platforms beneath, still holding their light and their Nile-green color, offer support, contrast, and harmony to the Red Wall. But presently everything begins to lose edge and accent.

And yet you do not doubt the still tremendous strength and lift of the Red Wall. It stands there like the underpinning of Creation. Lights and colors shift and atmospheres change as skies lighten and darken but the Red Wall holds firm.

> "Ten thousand years have come and gone
> It has not split or crumbled yet
> It still turns rose-red in the dawn
> Turns gold-red when the sun has set
> Ten thousand more may find it there
> Still standing in the purple air."

Ten thousand years! A mere group of ciphers in geological time! Yet how strange the isolated thought that during all those years that have crept in and crept out the Red Wall has stood there reflecting the flush of morning as the glow of evening, stood there in silence, without noticeable change, immutable as the globe itself! And high above it, like a signal-tower of the sky, Pima Point flashing in with sunrise gold and flashing out with sunset orange! A mere beam of light coming with no sound and going with no stain for ten thousand years! How strange the thought that, superficially considered, these wondrous walls should play no other part than reflecting the sun's splendor! Again the feeling of the theatre comes back. These changes of light and color are the mere shiftings of

Nature's footlights. Ah! but the play is staged for eternity! And it was from the beginning.

As the dusk comes on all the walls lose their form and structure; the fissures, pinnacles, and amphitheatres blur out; the surfaces flatten and merge into one dull face that lifts in a fluted edge against the still-lighted sky. Distance goes out, too. In a short time the walls to the west of Hermit Camp are two miles away or two hundred yards; they are a thousand or a hundred feet high. You cannot say. The dusk makes mere blurs of them—indefinite masses of dark in the half-dark. They bulk or recede or change in tone with the shifting light of the upper sky. A purple air veils everything, and through it one sees, on the high points, spots or bosses of color that still glow as though some latent fire were beneath them.

The same fading away in drifts of colored air goes on among the buttes across the River. The little canyons lying in between fill with gloom, the Tonto slopes shift into golden grays, the Red Wall bases become uncertain in form, the Coconino capstones look like spots of old ivory. Then the whole panorama flattens and becomes merely a purple blur with perhaps some porcelain-like glow from a high point of rock that still records the vanishing light. Mystery—a blue-and-purple mystery—spreads and enwraps the scene.

Night comes down upon the slopes and platforms and one by one the stars shine forth and dot the roof overhead. Fleecy clouds of the cirrus, thousands of feet in the sky, glow with the light shot up from below the western verge. Bats flutter across the stars, a poor-will far up the creek-bed begins calling, a coyote whines from a distant slope, crickets chirp in the grass of the garden near the camp. Otherwise there is silence—a silence that the low hum of the distant River emphasizes rather than destroys.

Usually at this hour there is some sigh or moan of the winds along the walls. At sundown, with the decrease of radiation, the heat in the Canyon rises up and out, while the cold air from the upper plateaus draws down the lateral canyons to take its place. An evening wind is thus set in motion that moves around the walls and amphitheatres with a sigh and, in times of storm, with a moan or shriek. You do not hear these sounds at such places as Hermit Camp, but up under the Red Wall they are often very pronounced. At times they are a bit uncanny and suggestive of the ghostly.

Moonlight in the great depth is perhaps something of a disappointment. The Canyon is a huge rack of form, a welter of color; and moonlight simply softens and subdues it, blurring its splendor and weakening its force. Especially is this true when

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PLATE 22. THE LOOKOUT.

Base of Point Sublime at left. Lookout center. Hermit Camp below, dry wash behind camp, false sage in foreground.

the moon is full and its rise takes place before the light has entirely gone out of the sunset west. The two lights then blend to produce a tonal effect —an effect that destroys accent, contour, and bulk by flooding everything with a warm silver glow. This is very noticeable looking down upon the Tonto platforms. As intimated some pages back, they appear cloud-like, almost phosphorescent, as though some internal light were shining from them. This peculiar luminosity of the Tonto, with the uncertain shadows of the walls, make even a familiar locality look strange. You grope for well-known points and get only mysterious lights, odd protrusions or recessions of form, unfathomable depths of gloom.

As the light in the west dies out the moonlight grows in intensity, becomes more luminous, produces better-defined forms. The eastern and southern walls under the Rim cast great fields of shadow into the Canyon, and where the shadow meets the full light shining on the lower slopes the edge is clear-cut—cut sharp. Colors are very pale and look bleached out. The greens of the pinyons are dull olive green, the reds of the Supai are pale pink, the yellows of the Kaibab are white.

When the moon is high in the heavens and the shadows have receded to a great extent, the walls take on a silvery or violet tone warmed by under-

lying pinks and reds. Certain points or knobs of smooth rock become spots of high light and great fields of half-light glow with a dull opalescence. The fire-rocks in the Inner Gorge occasionally throw back shadowy glintings from mica ledges—as shadowy as the lights seen in a dark mirror—but usually these walls remain neutral and forbidding.

The River running between the walls is quite as unresponsive. Sometimes there is the flicker of wave foam, but usually the surface is lightless. An angel's pathway and its broken reflection, flashing like a golden goblet sinking into the sea, are things that do not appear. The water is too turbid for bright reflection, too turbulent for pathways of light, too tossing for angel footfalls.

These dark walls and this whipsaw River with its metallic surge of sound seem to have little affinity with moonlight—moonlight that should be seen beside still waters with summer-night silences. Again we fling back to a former conclusion that romance and poetry are not fitted for the Canyon. It is too big, too vast a background, for song or fiction. The tradition here is of the rocks, not of the race—of the earliest stages of creation, not of the sentiment of a later life.

On moonless nights the Canyon depth is only a gloom. There may be a purple sky with stars overhead, but it can be seen quite as well from El Tovar

as from Hermit Camp. Mere night in the Canyon is not especially interesting. In fact, one might say without extravagance that the glory of the Canyon sets with the sun. It needs full light and clear vision rather than half-light and mystery.

CHAPTER XII

RIM VIEWS

THE lower platforms with the Granite Gorge and the River may prove interesting playgrounds for a few hours, but as the days pass by you begin to cast longing eyes at the Rim. You miss the horizon line, the lift of the sky, the broad expanse of light. After all, the depth is something of a pit, a shut-in abnormal valley at the least. In the summer it is very hot down there, while up on the Rim one has pleasant memories of night winds blowing through the pinyons and cedars. Besides, El Tovar has its attractions.

Indeed, the hotel is far too beguiling. From that comfortable quarter you look out and perhaps indolently come to the conclusion that you are seeing the whole Canyon. Nine people out of ten rest content with that view and that conclusion. They get no farther than the benches along the Rim. There they watch trail parties on Bright Angel, or study the houses and trees below them at Indian Garden, or locate buttes across the River with the aid of a section of pipe hung on a swivel. Perhaps the dessert end of dinner is curtailed to see a sun-

set effect on the north walls, and when the evening train goes out they go with it, rather glad that they came, and quite satisfied perhaps that they have "seen" the Canyon. What a mistake!

The view at El Tovar is limited. The hotel site was not chosen for its view but for its railway facilities, and the hotel itself was perhaps more of a happening than a planning. Look about you from where you stand and you will see on your left Maricopa Point, and far on your right Yavapai Point. You are in a pocket between these points and cannot see up or down the Canyon. Moreover, the pocket is in a swale and it is not possible to see over the ridge of either Maricopa or Yavapai. In the summer neither sunrise nor sunset (on the horizon) is visible from the hotel. You see it merely in the upper sky and as reflected from the northern walls and buttes. The view straight ahead is yours and little more.

That is not to say the view ahead is hardly worth while. One gets depth and plunge at El Tovar. And also width. It is the widest part of the Canyon—eight miles from where you stand to the edge of the Kaibab Plateau, twelve miles or thereabouts to the head of Bright Angel Canyon on the north side. This gives something of a sweep; enough at least to show many upright walls, dozens of isolated buttes, and scores of lateral canyons (Plate 2).

There is hardly any view, however limited, at the Canyon that does not reveal the grandly picturesque.

Practically all the face-walls are to be seen from the hotel terrace, though not at their best. Under Maricopa Point at the left are the cliffs of the Kaibab and below them come the sheer wall of the Coconino and the steps and serpentines of the Supai (Plate 1). Beneath these follows the Red Wall, which can be seen to the left and the right of Bright Angel Trail. There are arenas in it that from El Tovar are very marked in curvature because seen at a distance and with some perspective effect (Plate 3). Yet the distance itself deceives. The arenas are much larger than you imagine. Across the River, in the bases of the great buttes, there are even larger arenas and of more striking regularity of form.

Over the saddle between the Battleship and Maricopa Point there is an unpretentious ending of a promontory called Dana Butte, to which attention has already been called (Plate 1). It is peculiarly charming in form and color, especially in the evening light. Its form is enhanced by a pointed knob of red Supai shale at the top. The upper layers of Coconino and Kaibab were washed and worn from it centuries ago, and nothing now of the thousand feet of Supai remains save this small knob. Directly under the knob you can see a

red stain on the face-wall, while at either side merely a dull salmon shows. The salmon at twilight shifts and passes into many odd hues and, in conjunction with a surrounding of Tonto greens, forms as fine a gamut of low-toned colors as you will find anywhere in the Canyon.

The Tonto platforms at twilight, on both sides of the River, are almost always exquisite in pale tones of green, gold, saffron, or even rose and lilac. Across from Dana Butte they spread out in beautiful slopes and terraces. Stream-beds that drain Osiris, Shiva, and other buttes wind in and around just there, and the green and yellow of the shales lend note and accent. These buttes and terraces should be watched at sunrise and sunset for their subtle color-changes. For instance, just after the sun has gone down, drifts of colored air seem to cut off the bases of Shiva and Isis, the reds of the upper structure become coral red, and the Coconino caps glow like translucent porphyry. The buttes themselves become phantom-like and half-transparent. In contrast to this color-scheme, if you will look far to the right at Zoroaster and Brahma, you will find a different angle of light has flushed them with a brilliant Indian red.

The hotel bench is also an excellent place from which to see clouds, mist, and rain. The clouds are often veiled, fringed, plumed, winged, but more

often merely torn and scattered. They are not only above but frequently below the Rim (Plate 27). A cold rain falling into the Canyon, that has been blazing in the sun all day, means that a great deal of vapor begins to rise in warm currents from the depths. As soon as these warm currents reach the Rim they are struck by a colder air and condensed into cloud. Or the cold air may draw down into the depth and create clouds around and under the walls. One can see them forming, breaking, dissolving, with great distinctness from the Rim. Sometimes they seem to boil up from below and fill the whole Canyon; then they dissipate, clear away, and, as dusk comes down, grow pale blue, with the depths below them a dark ultramarine. Very forceful are these drifting patterns of blue and white seen against the dark depth, and vastly more beautiful than the fogs which merely bank the Canyon full and obliterate forms and colors of all sorts (Plate 28).

While the outlook from El Tovar is not to be depreciated, the view from Hopi Point, two miles to the west, is more imposing. Hopi and Maricopa are two spurs that project from one promontory, and perhaps Hopi gives the wider angle of vision. Both are spectacular. You look east, west, north, across miles of buttes and promontories. Those who are interested in identifying the buttes by name can here make out, to the west

From a photograph, copyrighted by Fred Harvey.

PLATE 23 SUNSET FROM HOPI POINT

Colorado below. Point Sublime central on horizon, lateral canyons, fluted Tapeats cliff, erosion everywhere

(Plate 23), the cap of Osiris; to the right of it Dragonhead, Shiva, and Isis; and around to the north Cheops and Buddha. To the east of Bright Angel Canyon are Deva, Brahma, Zoroaster, Walhalla Plateau, and Wotan's Throne; on the far North Rim is Cape Final, and in the eastern distance are the Palisades lying in front of the Painted Desert.

It is a wonderful view but not very intimate in any part except in the near portions under you such as the little Horn Creek, the Dana Butte, the great arenas in the Red Wall, a small section of the Colorado, and the dry Trinity Creek across the River (Plate 8). The view is too distant, too large, for intimacy; but then that is the quality of the whole Canyon. The great display of form, the mere bigness of it, have much to do with the feeling of exaltation that almost every visitor here knows. Mass, space, and sweep are elements of the sublime.

Something of sublimity, too, is revealed by the repeated masses of color—the great fields of it spread under the blue dome of sky. At first one thinks the red of the Supai the prevailing tone, but later on the Nile greens of the Tonto seem more potent and the mauves and violets of the Granite Gorge more enthralling. Of course none of these color-tones is so remarkable in local hue as in what it will echo or reflect under different lights. Light is the

great color-maker and nowhere works more wonderfully than on these Canyon walls. Add to this the binding medium of air—an air that shifts from gas-blue to rose, lilac, and purple—and you have a color display that may well produce æsthetic rapture.

The Rim Road runs west from Hopi Point around by the Inferno (that being the name for the basin that sets back and in just here) to Mohave Point. This is another point of observation not essentially different from Hopi, though each point at the Canyon has its variation from the type and possesses its own local features. At Mohave, for example, your distance view has not materially changed but you have to the east the steep walls of the Kaibab and Coconino under Hopi, and to the west a pitch downward into Monument Creek and its upper basin or watershed, known as the Abyss. The view of the red walls of the Abyss is decidedly impressive. The proportions are not only vast but the walls are graceful in a large monumental way—that is, they bend in and out and run on in great waves that flow but do not break. Pima Point is, however, the better outlook because the walls under the Mohave side, looking across the Abyss to the east, are more abrupt in lift and serpentine in flow. Besides, their color under morning shadow is astounding. The brilliancy of this color is partly

caused by reflection from the opposing walls in sunlight.

The Rim Road continues around to Pima. This point is the projecting wedge between Hermit and Monument Creeks. It runs far out into the Canyon and the distance views from it are magnificent (Plate 24). To the west are Cocopah and Havasupai Points; directly over the mouth of Hermit Creek is Point Sublime; and the famous temples and towers of the gods, whose names we ignorantly worship, are to be seen from almost every angle. The water-worn Canyon stretches on unendingly, the far ring of the horizon sweeps above and around it in a tremendous circle, beneath the sunset are the peaks of the Uinkaret Range, and to the southeast spreads the Coconino Plateau. What wonderful distances!

The Hermit Creek Trail leads down the west side of Pima, and Hermit Camp is almost under its point. By looking down you can see the trail where it emerges on the Tonto from under Cathedral Stairs. Cope Butte projects just there, being in kind a thin knife-blade under-prow of Pima Point. The Granite Gorge with its dark rocks is just beyond, and quite a section of the River is seen in its depth.

The Abyss is about as noble in enclosing walls as anything seen at the Canyon; and Pima Point, with Hermit Basin on its left and Monument Basin

on its right, is the most effective point west of El Tovar, barring Havasupai. From it one sees excellent illustrations of Canyon carving and plateau erosion. It is all about you. The point itself is little more than a left-over projecting cape. Eventually it will be cut through at the back and become an island—a butte. The drainage streams across the River should be noticed just here for the way they have broken through the backs of the Tonto platforms.

The climax of all western views is undoubtedly that from Havasupai. A wood road runs out to the point, but it is not well travelled, and the point itself is little visited. It is thirty miles from El Tovar and the way thither is not in good repute with automobilists. Bass Camp is two miles west of it, and from there the traveller reaches Havasupai by a faint Rim trail, or he can make a short cut through the woods by Fossil Mountain. The point is spur-shaped and (from the end) very steep in descent. There are swift downward flights that may be thought disturbing. The drop to the River in a mile and a half is four thousand five hundred feet—one of the most abrupt descents anywhere in the Grand Canyon. At the left, under Fossil Mountain (a mountain apparently cut in two and sometimes called Split Mountain), there are tremendous walls—sandstone and red-shale walls—

From a photograph by F. A. Leib, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 24. PIMA POINT, LOOKING WEST.

The cutting of streams shown on walls of point in left foreground.

that are amazing in their lift, their depth, and above all in their mass. Looking down from them might well make one dizzy, for here is the unmistakable precipice. But the traveller is not supposed to go over there on an idle quest of precipices.

Havasupai is the last of the very high points, for the Canyon walls begin to break down just here. The Grand Scenic Divide is to the left, under the foot of Havasupai, and that is the division line between the Grand Canyon proper and the flatter continuation down to the Grand Wash. The change, as already premised, means steeper palisaded walls, fewer isolated buttes, fewer side-canyons, and larger, more extensive promontories and platforms that push out in the Canyon and then descend in one or two swift drops to the River. The drops are often a thousand or more feet. Mt. Huethewali, around to the left, is practically the last of the Canyon buttes as the Scenic Divide is the beginning of the long, flat promontories. The Colorado here runs straight west, turns sharply to the south, and then doubles back to the north.

Perhaps the flattening down of the Canyon here is at the expense of grandeur, but to make up for it there is an increase in the picturesque. The terrain has a simpler surface. The lines are longer and more continuous, the forms are more massive, the shadows broader, the colors in larger fields, the

light greater in its spread. And what a superb sweep now in the horizon ring! The circle is quite complete, and not the least interesting segment of it lies over to the west against the sky—the Uinkaret Range. That Range, like almost everything in the Plateau Country, is more or less odd and strange when seen close to view. It is punctured everywhere with volcanic craters and covered with sheets of lava—a base of sandstone and shale blanketed with obsidian. But seen from Havasupai, seen as a mere decorative pattern, how beautifully the blue ridge stretches against the Great Blue and rims the sunset west!

Beneath Havasupai the Tonto spreads out and down in wave-like terraces, dry washes are between the slopes, and creek-beds cut through everywhere to the River. The Colorado itself is seen, but its enclosing purple walls are not so lofty as at Bright Angel, though its ribbons of rose granite still wave serpent-like. The Archæan is beginning to go out here, and farther on disappears entirely. On the north side of the River are buttes apparently set on star-shaped bases. Dox Castle, with a Coconino fragment on its top, lies almost directly north of you, and beyond it, a little to the right, is Holy Grail Temple, with King Arthur and Guinevere Castles. Straight to the east across Sagittarius Ridge is Point Sublime, which Captain Dutton

thought was the climax of all Canyon views. The long lines of Powell Plateau and the steep jut-out of Ives, Wheeler, and Dutton Points to the northwest are not less grand. Every point here is sublime. And everything in the sunset glow is wonderful. An orange horizon, above it a green sky running into lilac, and all the shadows in the Canyon pitched in violet and purple! What a glory of color!

Sixty or more miles to the east you can see, against the horizon, Cape Final, and opposite to it on the South Rim is Desert View. That is the beginning, as this is the ending, of the Grand Canyon proper. Both extremes sink down a little through dips in the strata and have not the full height of Hopi and Grand View, but perhaps they have more color-splendor. Down at the eastern end, stretching away for many miles, spreads the Painted Desert. The name suggests an attempt to describe its color, but the name is wanting in imagination. It fails to create an image of the reality. But, then, all words fail with the Painted Desert.

CHAPTER XIII

GRAND AND DESERT VIEW

Moving east along the Rim from El Tovar brings one, in half an hour, to Yavapai Point—the other horn of the hotel crescent. It is almost directly opposite the Bright Angel Canyon, and from it one has an excellent view of the great buttes across the River (Plate 12). You can also see down the Grand Canyon to the west as far as Powell Plateau and to the east as far as Comanche Point. It is a fair field for dawn and twilight effects. Yavapai is quite frequently resorted to at evening (Plate 27). The sunsets from there are often magnificent.

From this point two flashes of the River are seen —neither of them extended or inspiring. Pipe Creek is in the lateral canyon at the right, while to the left one sees the Red Wall under the Battleship with its huge amphitheatres. Bright Angel Trail, in its lower reaches, is beneath the toe of Yavapai; but that ephemeral line cut by mule-hoofs should not absorb attention to the neglect of the great lines in these walls and slopes cut by water through the centuries. Nature is always the dominant presence here.

To your right, looking southeast, is Yaki Point, and below it the promontory known as O'Neill Butte; but you must follow the Rim two hundred yards beyond the sign "Yavapai Point" to gain this view. The trail to Yaki runs by the Rim around from Yavapai. It is a winding way leading through a burned section, and in the summer months is interesting because of the wild flowers growing along it. At the head of the side-canyon between the two points, on the Kaibab taluses, is a small grove of Douglas spruce and white silver fir—several hundred of them standing together under the Rim, their dark greens and pointed tops making a wonderful wild-wood tapestry. How still they stand! When you begin to lose interest in the wear-down and wear-out of the Canyon, you can come back to this grove under the Rim and feel that all is not destruction, that here Nature is building up rather than dragging down. There is no riverine roar about it. The growth goes on silently and serenely through the years. What a beautiful growth! You will not find anything more attractive at the Canyon than these still and lonely trees.

Yaki Point (the original name, O'Neill, survives only in the butte that runs off from the point) presents substantially the same vistas up and down the Canyon, the same buttes and promontories across the River, as Yavapai (Plate 25). You are only

two miles farther east in an air line. Perhaps you get a closer view of such huge sections as Walhalla Plateau and Wotan's Throne, or of such vast depressions as the Ottoman Amphitheatre, or see in clearer outlines Comanche Point and the Painted Desert, whither we are tending. Directly across the River is Zoroaster Temple, which should be looked at again for the enormous arenas in its Red Wall and the wash-down of streams around and about it. And notice the Tonto platforms on both sides of the River. How beautifully they run on in great waves and swells! How supremely true and right in line these sculptured waves of the lower terraces!

If you continue by the Rim to the east you circle the basin between Yaki and Shoshone (Inspiration) Points, and everywhere along the way the view is not only open but grandly beautiful. Even looking into the lateral canyon that lies between the two points shows slopes and platforms that are supremely graceful. Shoshone Point when reached proves to be arrow-headed, sharp-pointed, somewhat precipitous on the sides. The look to the west from there is interrupted by Yaki Point, but the look to the east is open. Shoshone is one of the fine view-points at the Canyon, quite as fine as Grand View, but less accessible. It is about seven miles from El Tovar by a rather poor trail.

From a photograph, copyrighted by Fred Harvey.

PLATE 25. ACROSS FROM YAKI POINT.

Tonto platforms below.

Seven or eight miles farther to the east and you arrive at Grand View—the one-time travel-centre at the Canyon, and still one of the best places for sight-seeing. Back from Grand View Point a mile or more there is the remainder of a hotel and some small cabins. The place was a lively settlement when copper was king in the Canyon and relays of burros were bringing the metal up to the Rim. But the copper king died early, the trail is now abandoned, and a few cast-off burros, roaming the lower slopes, remain to bray the tale of failure. Grand View is no longer a copper camp, but it has lost nothing of picturesqueness by the passing of the miner.

The western yellow pines grow everywhere about the old hotel, and their reddish-cinnamon trunks often frame up picturesque views of the Canyon, enhancing it perhaps by limiting its scope. These pines extend out upon Grand View Point, and with them go small groves of pinyons, cedars, oaks, and thickets of cliff-rose. Vegetation seems more abundant here than elsewhere, and, even when you come to the extreme point, there are trees about you. But they do not shut out the view in any way. That view is really stupendous. The altitude is seven thousand five hundred feet, which means that you are on a high point of the Canyon Rim. The Canyon itself is wide here and the circle of vision correspondingly great. The view is much too compre-

hensive for the five-minute tourist who gazes while his car hums and his chauffeur smokes a cigarette.

If you look around the horizon you will once more find yourself in the centre of a great stone circle. Only at your back does the fringe of pines break in upon the ring. Across the River from you the buttes pile up enormously. Just over the green-tinged ridge beneath the point is a square butte with two Coconino outcrops upon its summit. In the pseudo-poetic nomenclature of the Canyon maps this is known as Angels Gate. Farther around to the right is the lofty Vishnu capped with a Kaibab fragment which lifts higher than the point upon which you stand. Between the two is Wotan's Throne, two hundred feet higher than Grand View Point, and growing on its flat top the same pinyons and junipers that flourish along the Rim. It is a huge detachment from the northern plateau still standing intact, and showing all the Canyon strata in regular order. There is no better view of it than from this point.

A little farther to the right, on the North Rim, one can see the apparent end of the high Kaibab Plateau in what is called Cape Final. It is, of course, merely a point on the north wall thrown into sky relief by our position. Under it, but apparently to the right of it, is a lantern-topped butte called Jupiter Temple. Still farther to the right

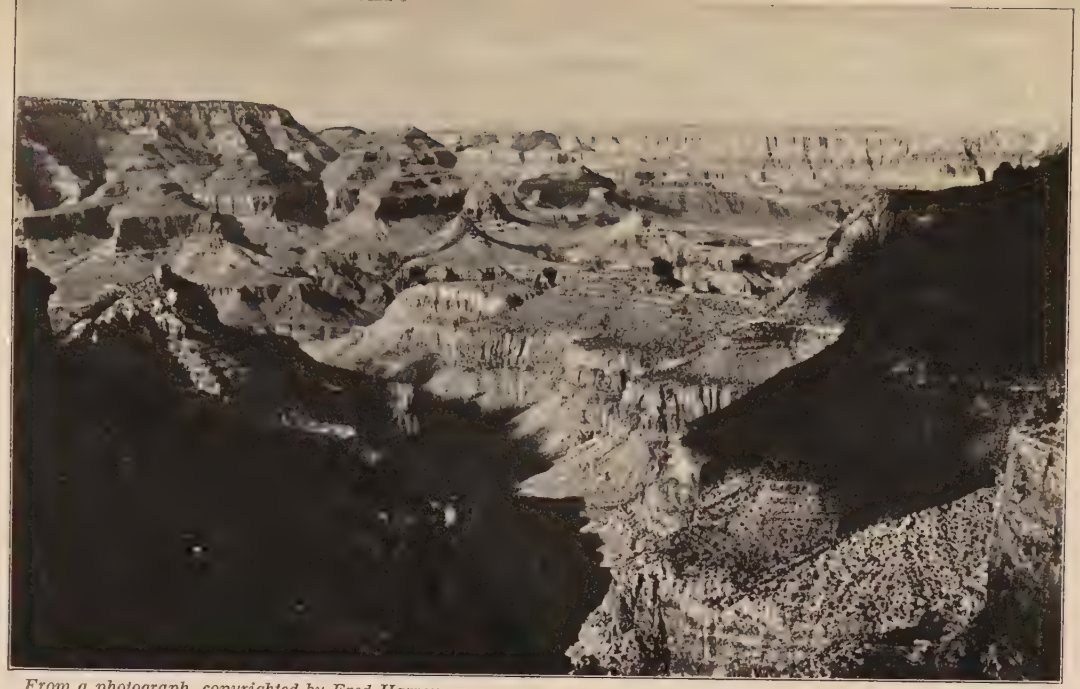
one sees the Palisades, and beyond these the long reach of the Painted Desert (Plate 26). Only a glimpse of it is given here, but that glimpse is suggestive of rose and gold under strong sunlight. It lies beside the Canyon, and in kind is just as marvellous and surprising as any part of the Plateau Country.

Continuing around the horizon to the right you see Comanche Point, on your side of the River; and then Desert View with Lincoln, Zuni, and Moran Points. This brings you back almost to Coronado Butte (formerly Ayer Butte) and Grand View. All these points are merely sharp spurs or projections in the South Rim from which different outlooks are obtainable. Above them, stretching for miles, you can see the reach of the Tusayan Forest, and far to the south are the blue bases and snowy tops of the San Francisco Mountains.

The look to the west from Grand View is less open because Shoshone Point and some high ridges lie in the way. That does not, of course, interfere with the view to the great buttes lying to the right and left of Bright Angel Canyon, nor the far view across the Hindu Amphitheatre to Point Sublime. The full western reach of the Canyon is perhaps best seen from Desert View; but at Grand View there are enough marvels for any one on a summer's afternoon.

One never ceases to marvel, for instance, over the sweeping jade-green terraces, or the lift and strength of the exposed cliffs. The Rim here is deeply notched by cut-back canyons that show magnificent walls. These latter always impress us with their bulk and we think of their endurance as almost everlasting. Yet the processes of breakdown are here. They are apparent in the mass extending out from the point of Grand View. It was originally part of the point but has collapsed and crumbled to its present condition. The splintered wall a little to the right, where the trail runs down to the River, again testifies to destructive processes that are slowly wrecking the outstanding promontories. Below is Horseshoe Mesa, where the breakdown has been more complete. At one time, no doubt, Grand View Point extended out and over this mesa, and the River ran only a few hundred feet below it. The Gorge was then perhaps cut only through the Kaibab sandstone, and the Archæan rocks were five thousand feet below, untouched and undiscovered. But that was ages and ages ago—so many that even geologists can merely guess at them.

Destruction is at the right of Grand View, too. There are firm walls in the little canyon that heads up toward the old hotel, but across this canyon you can see a broken butte or promontory, known as



From a photograph, copyrighted by Fred Harvey.

PLATE 26. FROM NEAR GRAND VIEW.

Cape Final on Rim at left, Palisades of Desert at back, Painted Desert in distance.

Three Castles, that seems to have collapsed at its toe, sagged down several hundred feet. For all the massive underlying beds there has probably been some break in the strata just here—a break caused by pressure or subsidence. The promontory may have an unusual geological history, though that is not probable. If you were over there and looking this way, toward Grand View, you would see that this point, too, sags down at the end. There is minor faulting, with water-wear, everywhere in this region. And yet there is no lack of stout walls still standing and seemingly defiant of the elements. Look at the cliffs under the east side of Grand View. They are lofty heights with little suggestion of weakness about them.

Eastward, still eastward, and presently we arrive at Lincoln Point, seventeen miles from Grand View. The western view from here is one of great distances that fade out in mists and hazes; but under the haze, near at hand in the Granite Gorge, the River may be seen emerging from behind a long red ridge, then disappearing around a projecting talus, only to reappear in sections farther on. It seems to sink lower in the Gorge as it runs. There is apparently a rush of water here—a rapid downward descent. You feel as though the River were disappearing in underground caverns.

More directly in front of you another phase of

the River shows in a winding, lazy S, though when you are down close to it the water is found to be anything but lazy. Sand-bars and green bushes appear by the water's edge, and coming in from the other side is a dry creek-bed (Unkar Creek) that shows more patches of green and lines of sand. Maroon and raspberry-red slopes of Unkar formation come down to this creek-bed and make a wonderful chorus of color. The notes fairly sing, so resonant are they.

This Unkar Creek with its color-display should be seen at sunset, for the western light turns the hues into things both rare and strange. The maroons and garnet reds are stimulated by the green of the bushes and the gold of the sandy creek-bed. They increase in brightness through complemental affinity. It should be noticed also that the winding line of the creek-bed swings through a little group of terraces and slopes and that it accents and harmonizes the lines of the slopes.

The River can be followed far up to the east, disappearing for a moment behind a high ridge with a crumbling cap of sandstone for its apex, and then reappearing. It is a rather long stretch of water that is visible. To the right of it is Comanche Point, and beyond it the Little Colorado comes in to join the greater stream. Still farther on is the Marble Canyon, the so-called gateway to the Grand

Canyon. The eastern wall, in which Comanche is the high point, has already been referred to as the Palisades of the Desert.

Stretching away beyond the Palisades for a hundred miles is the Painted Desert. Standing out from it the cliffs of the Little Colorado show at first, and beyond them appear the Echo Cliffs, the Mormon Ridge, and other heights. These high divides fade away one beyond another until finally lost in the distance. Far to the east, almost blotted out by lilac atmosphere, you can catch the outline of distant mountains. They are a part, no doubt, of the great continental sierra.

For swift change of scene turn a moment and look behind you at the sweep of the forest. If you look up to the west, toward El Tovar, the horizon line will lead you around to the left in a great half-circle and you will get the elevation of the Coconino Plateau. You will notice a large sunken basin in here that, owing doubtless to the dip of the strata, trends down and off toward the southeastern end of the Painted Desert. You look over this sunken basin directly south to see a long platform that evidently was once the normal level of the plateau. Above and beyond it appear the San Francisco Mountains. This is not the view that you came to the Canyon to see, but is it not magnificent?

Desert View (originally Navaho Point) is two miles from Lincoln Point and contains more multiplicity and variety in unity than any other outlook at the Canyon. The chief view is from the point and extends for many miles in almost every direction. The elevation (seven thousand four hundred and fifty feet) is only a little less than Grand View, but the Canyon here is more open. The inner Archæan walls are partly broken down on the south side and the slopes leading up and out are less abrupt. Across the River you will notice that the dip of the strata is from west to east, that the beds seem to be sinking and disappearing under the Palisades. This is, no doubt, responsible for the flatter effect.

The open view is most welcome. And yet the steep descent over precipitous walls does not disappear. There is abundance of cliff under the Palisades (Plate 33), and looking down the Canyon to the west, you see ridge and promontory and butte lift, one above another, in plane after plane of distance. All the great buttes and points cut in or overlap one another. Their height and depth seem stupendous to bewilderment. Perhaps this is enhanced by a striking contrast, for to the west everything seems on end, while to the east everything lies down flat. The perpendicular is sharply contrasted with the horizontal.

The horizontal is, of course, the Painted Desert. Looking across it at noontime gives the impression of great flatness, with only a few outstanding buttes or points, but at sunset the heights become glorified, and you are perhaps astonished at the hurdles of ridges rising one beyond another. Lines of arroyos alternate with lines of ridges, and yet the general effect is that of a huge inland basin swinging to the east in flat distances. It always seems sleeping in the sunlight, dreaming, motionless. Repose is there, and the feeling of repose is impressed upon you by the flowing horizontal lines. What a contrast to the perpendicular cliffs of the Canyon lying off at right angles to it!

Now it should be noticed that these lines which contrast with and accent each other do not, paradoxically as it may sound, combat each other. They meet and blend even in their contrast. The horizontal lines of the Kaibab and the Coconino in the North Rim seem to run on and into the flat lines of the Desert, and the upright lines of the Canyon walls are repeated in the Echo Cliffs and the Mormon Ridge. Still, it is generally true that the Canyon lines of cliff and butte are perpendicular. They are angle lines and suggest restlessness, action, aspiration. Over against them are set the Desert lines that in their low relief are horizontal and suggest relaxation, quiessence, rest. The con-

trast and yet the unity in the contrast are very remarkable. I know of no such landscape elsewhere, though one gets a similar effect by the seashore where some bold headland stands with its feet in the sea and presents its steep cliff-wall to the outstretched ocean.

But we have not wholly comprehended this view by analyzing a web of lines. There is a color-contrast that is perhaps just as remarkable as the apposition of lines. I am not now speaking of color in spots of magenta or *sang de bœuf* or garnet, but of the total effect. Look down the dark Canyon and get the red, purple, and blue of it, and then turn quickly to the east and note the yellow, gold, and rose of the Desert. What superb color-schemes! Is there anything disturbing about them? Does the one quarrel with the other? Are they not in perfect harmony?

Even the atmosphere may be reckoned with as contrast and yet accord. That of the Canyon is gas-blue, or purple, or perhaps violet, whereas that of the desert is rose-blue, golden yellow, or opalescent. I do not now mean the lights or shadows but the air itself—that intangible transparency that we think colorless but which in reality takes color from every sun-shaft striking its dust-laden particles. The hotter and dryer the weather the more

pronounced in color the atmosphere. When there is a sand-storm on the Painted Desert the rose and violet of the atmosphere change to a reddish purple. It is apparent to the dullest eye. But there is always more or less of invisible dust in these dry regions and there is always more or less of colored air.

To this panorama of line, color, and atmosphere you must now add the most abiding beauty of all. Look up at the great dome of the sky—the blue vault with its white mountains of cumulus piled high in the air and perhaps fretted with golden fire by the setting sun. When and where have you ever seen such a comprehensive depth, such a magnificent arch, such a translucent blue?

If you look closely at its cobalt depths you may perhaps see portions of it breaking into violet vibrations—vibrations that at times seem to form into faintly-seen descending shafts. What an immensity of precious color above the world! And how it seems to cap the vast landscape! Compared in color with the earth it is the greatest apposition, the mightiest contrast of all, and yet again, and finally, there is no lack of harmony. The dome fits down in color as in form and completes the picture. Truly a marvellous picture!

People come here to see the Canyon—to look

down. But they should also look up. For the sky here, as elsewhere, is the crowning feature of landscape. Out of it comes light, light the creator of all things visible, light of which the beautiful blue is only a broken and dispersed fragment.

CHAPTER XIV

FROM DAWN TO DUSK

Days and weeks can be given to Desert View without exhausting the scene or the interest. You are away from the hotel and the crowd, and can see things like a lone eagle from your point of rock. Both the rock and the eagle are here (an eagle usually has a nest every summer not five hundred yards to the east of Desert View), so the allusion is not forced. If you watch the eagle you will see that she does her coming and going early in the morning and late in the evening, and, if you follow her example, you, too, will go out to your point of rock at dawn and at sunset.

Perhaps you will have noticed, as at Lincoln Point, that the Canyon here is happily disposed for morning and evening effects because it runs practically east and west, and the light strikes not so much across it as along its length. The sun comes up over the Painted Desert and drives its golden shafts down the Canyon for sixty miles or more; at evening the reddened beams drive back through the Canyon upon the mesas and ridges of this same

Painted Desert. If there is anything unusual, any special spread of splendor coming from that

"Nebulous star we call the sun,"

you are sure to see it here.

The first gray half-light of the dawn has no effect on the Canyon. It is only when it turns pale yellow and begins to creep around the horizon that faint reflections appear upon the eastern faces of the Kaibab and Coconino. Often the light from below the verge at first strikes high up on the zenith, making a white spot on the blue that in turn illumines the depth; and, often again, feathery cirrus clouds up there will catch the light and begin to redden, casting down pale pinks upon the walls below. As the light increases in the east the color brightens from silver and rose to pink and perhaps carmine. The face-walls make answer in grays, then silvers, then saffrons creeping into orange, followed by roses and heliotropes. They are wonderfully delicate colors.

One by one the tops of the buttes and points and promontories take up and carry on the light far down the Canyon. First one glows and shifts into a bright garb, and then another farther on repeats the litany of color. As the light increases, the color spreads down the walls from the high points. The local hue of the strata begins to come out, the pur-

ples of the depth awaken, the shadows turn ultramarine, the air becomes gray-blue, or sometimes pink over purple.

The reflected lights from sky and cloud arouse the Canyon to its inner depths. There is a shaking off of the night gloom, and if the sky in the east is a broad band of orange or fiery with red clouds, the reflecting walls will show very lively hues. When the sun itself comes over the horizon there is instant focussing of high lights on the rocky points and the forming of blue shadows behind every interposing tree, ridge, butte, and promontory. The change is swift and positive.

With the coming of the sun you can almost make yourself believe there is a faint music of the elements, or at least a trailing of wings. But no.

> "Not with the roll of thunder drums,
> But softly, soundless, as beseems
> The alchemist of color dreams,
> The Sun God comes."

The light falls on the Kaibab faces and changes them to light gold or warm orange, Wotan's Throne reddens, the tips of the buttes turn pink; but there is no sound to warn you of the change. Nor is there any permanence in the change. The colors shift and go, and as the sun lifts higher in the sky you notice that, while the local color is more pronounced,

the reflected colors from the sky and cloud seem to grow fainter and duller. The splendor of the dawn soon goes out before the more commonplace color of the morning.

For as the sun continues to rise, the Canyon begins to lose not only in hue but in definiteness. This has already been alluded to in connection with the abnormal appearance of the buttes at noonday. The sun high in the heavens plays havoc with lines and surfaces. Planes begin to shut up bellows-like and perspective collapses. Drawing, too, fails. Objects do not project or recede, or give a sense of bulk or weight, but seem continuous or superimposed, one upon another. The long promontories running out from the Rim not only lose their thickness and resemble stage screens, but they lose their relative position. After nine o'clock in the morning even the isolated buttes do not seem isolated. The overhead light reflects rather than illumines, distorts the normal appearance, and makes everything uncertain, illusory, indefinite. A haze envelops the Canyon and a beautiful blur is upon it; but the effect is disappointing to those who would see the reality. You must turn to other things until the depth comes back to itself in the late afternoon.

The midday period is occasionally varied by flying cloud-shadows that chase each other across

From a photograph, copyrighted by Fred Harvey

PLATE 27 CLOUDS IN CANYON.
Yavapai Point at right.

the platforms, or by sunbursts that fling down their search-lights into the Canyon, revealing hidden depths and dormant colors. Rain, of course, veils everything. Even the thunder-storms that let down trailing fringes of rain—let them down ten thousand feet—shut out the view temporarily. But they also often bring out the profiles of the buttes in relief and reveal their fine lines with great effect. In fact, one does not know what forceful contours these buttes and promontories possess until he sees them with a rain-veil behind them. They then begin to resemble sierra ridges in their outline drawing.

Often, again, after the rain has passed, the hot rocks will steam and the sunlight will flash on wet pinnacles with a glittering effect which, shown in relief against deep-blue shadows, and in connection perhaps with a rainbow and dark passing clouds, is very picturesque. The rainbow at the Canyon happens quite easily, and sometimes apparently without rain. I have already mentioned the appearance at noontime of the spectrum colors, waving like a flag, in the cirrus directly overhead. And with no other clouds in sight. It is a very strange phenomenon.

During the long summer afternoon the Canyon seems to doze in the sunlight. It has a blue-gray color without accent, tone, or quality. The tourist

may think it wonderful but the artist knows its monotony. At five o'clock, however, a change begins to take place. The Canyon colors begin to revive faintly, the blue shadows draw a little behind buttes and promontories, the ledges and platforms and pinnacles begin to lengthen and lift, the walls become enormous in bulk and sharpen in contour. Gradually perspective and planes come back. As the sun slips down the western sky the whole Canyon continues to grow more intense in light and shadow, more acute in line and color. It is the dramatic hour.

The spectacle of a Canyon sunset is usually one of intense light and warmth, and the sky absorbs attention to the exclusion of everything else. Perhaps it should not. One may not wholly agree with Whistler in his jibe at those who admire "a foolish sunset," and yet still consider that the effect here, on Canyon and Painted Desert, is perhaps more beautiful than the cause itself. The effect is more subdued, more subtle in its mingling of local hues with the colors flashed by the sun. It is color filtered, strained, refined, and for that reason perhaps more acceptable as more purely sensuous.

The various hues that appear on the Canyon walls at sunset are akin to the evening glows of snow mountains. The very brilliant reflections are not usually from the sun itself, but from the sky

or clouds that are set glowing with color by its light. The molten golds, scarlets, and carmines that surround the sun, or are above it, are the torches that fire the buttes with flame and turn the pinnacles into towers of golden light. Often they "glow like plated Mars," and occasionally the illusion of molten metal appears in pinnacles, resembling the red of hot iron that finally dies out in a beautiful ash gray.

From Desert View at sunset, tints and tones innumerable are seen, not only on Canyon walls, but on the mesas of the Painted Desert. The barrage of light seems to lift and lift, striking farther away as the sun sinks in the west. You can see it move along the ridges, spreading from cliff to cliff, and tingeing all the faces a bright vermilion. Far to the east it flies, growing fainter and fainter on butte and ridge, until it is lost in the thick violet air of distance. Navaho Mountain is too far away to respond in anything more pronounced than a rosy tone. It is the last echo.

These sun-shafts and rock reflections on the Desert are just as remarkable as those in the Canyon. The background of the Desert, with its thick, dust-laden air, makes possible a perfect blend. At sundown the general tone of the whole flat basin is golden with a rose tinge in it, and through this envelope you see the red of the Echo Cliffs glowing

like the fire of a bright opal. The jewel quality of desert light and color are never so apparent as just then and there.

Occasionally at sunset a wind will pass over the Desert's face, raising great clouds of dust that reach up almost to the zenith. This dust-veil is, generally speaking, rosy red, but like the dawn and the sunset sky, it also shows faintly the colors of the spectrum arranged in order. It is a rather thick veiling, and the barrage of sun-fire meets opposition. The cliffs through it show lurid, the buttes smoulder, the mesas are ashes of roses. It is a red-and-purple mystery.

If you look now quickly to the west you will find that the Canyon, too, in some sympathy with the dust-cloud, will also show strange hues. The air down in the gorge is thick with purples, but above this a violet atmosphere lies under the Rim and around the buttes and points. The projecting promontories that, seen far down the Canyon, seem to overlap one another, now appear once more like the wings of a stage-setting illumined by dull Bengal fire. Blues and mauves and heliotropes are everywhere. It is a violet fantasy in sky and Rim and Canyon, as unreal as any vision out of the Arabian Nights. And it becomes still more fantastic, as well as exquisite, if you will lie down on your point of rock and look at it sideways, with your head on

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PLATE 28. CANYON IN FOG AND SNOW.

Near El Tovar, pinyons at left and right.

the rock. The position seems to bring into play some unusual or unfatigued portion of the retina, for the colors appear greatly enhanced and beautified. All the world now seems swimming in lilac and violet.

Turn again to the Painted Desert and you will find that the maze and mystery of it have deepened while you were looking at the Canyon. St. John at Patmos can have seen nothing more supernaturally glowing. And note that the glow is not merely in the sky but all around you. You are within it. The purple air envelops everything, and the ridges and cliffs faintly seen through it finally go out in rose colors as Point Sublime to the west disappears in gun-metal blues. The whole world now seems like some dark opal, with dull fire-spots on its surface.

Once more, from your recumbent position on the rock, look around in the growing dusk at the vast circle of the horizon. It is complete save for the small segment of forest behind you. Turn over on your back and look straight up at the sky

"Clad in the beauty of a thousand stars."

The red moon is coming up over the pines back of you, but as yet makes little impression on either the sky or the Canyon. The dusk enfolds you. By midnight the air will clear, the moon will whiten, the sky will deepen, the stars will glisten. Before

dawn the morning star will look so large that, like the Arabian sun, you can fancy seventy thousand angels necessary to start it each morning on its way. But now there is nothing but a dusky world swinging in blue space and carrying with it an envelope of colored air.

How intensely impressive this purple veil of night! The Canyon is even more wonderful in color and atmosphere than in rock strata and countersunk River. It is not the eighth wonder of the world but the first.

CHAPTER XV

THE TUSAYAN FOREST

A WEEK at the Canyon may suffice to exhaust not only one's adjectives but also the keenness of one's appreciation. The imagination perhaps lags and does not rise along the perpendicular walls as on the first day. The æsthetic sense becomes a little dulled and we cease to wonder or stand amazed or lose ourselves in a dream of beauty. Possibly it is time to vary the scene and renew sensation by change.

There is but one change of scene at the Canyon, but happily that is a complete one. It is the forest that lies back from the Rim. A few steps within it and the panorama of the Canyon has disappeared and you are among the cedars and pinyons, as shut out and away from the "view" as though in an Alaskan wilderness. Your circle of vision is now fifty or a hundred feet in diameter—no more. If you move back a quarter of a mile you encounter the Western yellow pines, the forest opens up a little in aisles and parkways, but your range is still limited. The "view" in fact now counts for little, and your interest must be centred upon the in-

timate things of plant and animal life. Therein lies the contrast to the Canyon.

If you start back into the forest without making a mental note of your general direction you may become confused and lose your way. Once in the woods all the cedars and pines will look alike to you, the rocks and swales will offer no guide-posts; the trails—well, they are somewhat mixed with cattle-runs and may lead any way but the right way. You must remember the points of the compass and be able to locate them by the sun. Then if you get geographically askew you can consult the sun for east and west, and know that if you are east of El Tovar, walking to the west will surely bring you out on the railway, as walking north will just as surely bring you out on the Rim.

The forest back from the Rim is not an isolated region. It is part of the great Plateau Country—the Coconino Plateau. Drive a spade into the ground anywhere and it will soon strike the limestone. Both the limestone and the forest once stretched across where the Canyon now yawns and joined their kind on the Northern Rim. The soil is usually bone-dry and only a few inches in depth. It supports no exuberant growth, for the rainfall is not great, and such as there is drains off quickly into the arroyos and small canyons. Only the hardiest life can exist here, though down in the

Canyon, where there are springs and streams, all kinds of plant life may flourish. The plateau vegetation is more or less desert in character. If you are not used to wood travel you are made sharply aware of this by your feet coming in contact with the spines of ground cacti and your head and shoulders with the dry branches of the cedars. Everything here is dry, hard, and sharp.

The cedar (it is not a cedar but a juniper) is a characteristic growth. It is twisted of trunk, octopus-like in spreading roots, chary of foliage and berries. Dry and shredded in the bark, resistant of wind, fighting off the elements, keeping its green in spite of winter storm, it holds fast with tenacity and endures with fortitude. One can hardly guess its age from its twenty or more feet of height, though the bulk of the trunk near the ground suggests a clue. Many of them, no doubt, are centuries old. After they die, years elapse before they fall and perish through decay. The plateau is covered with their gnarled skeletons still standing, with bleached arms and broken branches, against wind and storm.

The pinyon, sometimes called a nut-pine or stone-pine, is a dwarf, too, growing no higher than the cedar, and is perhaps less hardy in growth. Wind, fire, and mistletoe harry it, but it grows readily and makes up in breed what it lacks in toughness. One

finds it everywhere along the Rim. The Indians gather the nuts and make a bread from them—that is, if the jays do not arrive before them.

The Arizona or Western yellow pine grows back from the Rim and is the largest tree on the plateau. It has a thick trunk, stout branches, reddish bark, and an irregular round top that lifts at times a hundred feet or more in the air. When old these pines show the ravages of wind and lightning. They do not grow thickly near the Canyon, and standing alone are liable to be blown down by heavy winds. Even in gentle breezes they sway considerably, and are usually whispering and sounding in their tops. They make up the bulk of the Tusayan Forest.

Very beautiful are the open aisles of the forest as one walks there late in the afternoon when the sun-shafts, striking the tops of the yellow pines, turn their green to gold. That greenish gold against the blue of the sky with the reddish yellow of the bark beneath make up a color-harmony that you might think quite wonderful if the Canyon were not so near at hand. And how stately the pines! Every member of the family stands erect, is arrow-headed, arrow-shafted, and shoots directly at the zenith. They always command admiration. Here in the forest they grow singly, or in groups of three or four, but each one lifts its shaft and shakes out

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PLATE 29. ON THE SOUTH RIM.

The Tusayan Forest coming down to the Rim.

its needles independently of the others. A noble tree is the Western pine.

The conifers are about the only trees that can be looked for at this seven thousand feet of altitude, and yet there are others. A few scrub-oaks, some frail ashes, and some locusts grow here and there. The acacia family will occasionally creep up from lower levels, but it requires heat and does not flourish on the Rim. The Douglas and the white spruce do not grow above the Rim, while the aspen and the live-oak appear across the River on the Kaibab Plateau but not in the Tusayan Forest.

Of course there are many bush growths, some of them standing so thick that they take on the appearance of chaparral. They are usually gnarled and twisted in stem, shaggy in bark, and hard in point. The cliff-rose, sometimes called the quinine-bush (cincona) or "mountain mahogany," is one of the most prominent of them. It often grows in thickets, and when its white flowers are in bloom, scents the air with its perfume for long distances. Next to it one finds in the open spaces, especially to the west of El Tovar, many acres of sage-brush, peppered with bunches of Mormon tea. The so-called "mescal" grows in isolated spots on the plateaus, but it prefers the Canyon terraces as warmer and more protected. Just so with most of the yuccas, Spanish bayonets, and cacti. Here in the

woods, especially among the dwarf growths along the Rim, one often finds the pincushion cactus growing down close to the ground, and in July putting forth a beautiful magenta-hued flower. Other varieties blossom out with white or yellow or purple petals.

None of these desert growths, however, flourish well in the forest. Down on the Tonto slopes, rooted in a dry mineral soil, they take on the strange hues of the hydrangea in our Eastern dooryard. There they are at home and unique in both environment and development. By way of contrast the forest in the spring grows many flowers in its open spaces, and all summer long there are relays of anemones, mountain-pinks, Maricopa lilies, larkspurs, lupins, pentstemons, paint-brushes, sunflowers, asters. The variety is much greater than has been generally recognized. After the showers in July there are legions of swaying scarlet pentstemons under the rock ledges and innumerable beds of small close-lying flowers in the forest spaces—blue-eyed, star-shaped growths that have an affinity with the mosses and lichens, humble growths that do not flare or startle but charm by their lowliness and their simple patterning. The floral display is often quite puzzling, even to the botanist, so numerous are the varieties, so odd the forms and colors. And almost all of them scentless. The great masses of

them are born to blush unseen; but so far as I have observed they waste little sweetness on the desert air.

Beautifully as these flowers grow in the aisles of the forest, they have not the absorbing interest, perhaps the sentimental appeal, of those that grow on the rock ledges of the Canyon. The mosses that lie in beds along shelving rocks and droop down over precipices, the flowers that blow along narrow platforms, the thin golden grasses that sway in the wind from a cranny in the wall, seem so pure in type, so pale in hue, so graceful in form! Insufficient soil and moisture have made them willowy in stem and bleached in flower and leaf, but fighting the elements for life has given them a lithe quality, a tenacious grip on the rock, a patient endurance. How fear-free and care-free they appear to us as they nod and sway in the breezes from their eerie heights! These are the true cliff-dwellers. What patience, serenity, and silence they might teach us if we would only pause and ponder!

The forest naturally gives some protection to animal life, and time was when there were cougars, timber-wolves, bear, and deer here in abundance; but they have nearly all slipped away, and are now to be found only in the more remote woods of the north side. Some deer remain and are occasionally seen at sunset, in bands of three or four, near a

cactus patch or a cattle "tank." They make trails down to the River, over very precipitous heights, for in the summer months they must have occasional water, but their natural runways are in the forest. The mountain-sheep—there are a few left in the Canyon—rather outdo the deer in trail-making, though they do not come up to the Rim and are not found in the forest.

The flexible coyote roams the woods, if there is any food to be gained thereby, but he prefers the open. He is a past master of roaming, and usually makes himself at home wherever he happens to be. Any place that lends to sneaking and skulking is quite to his fancy—provided always that there is a chance of something to eat. His appetite is extremely good, but it seldom meets with complete liquidation in this forest region. The Painted Desert is a happier hunting-ground for him, though over in the Aztec Amphitheatre country he occasionally does a prosperous business digging wood-rats out of their mounds. The energy and shrewdness of the coyote are never to be underestimated. He is the genius of his family and can pick a living where his relatives would starve.

The wood-rat is found almost everywhere, and he, too, has energy if not shrewdness. The marvellous mounds of rubbish that he accumulates quite outdo those of the muskrat. His wood-piles in the forest

furnish fuel for campers and interest for tourists; but in spite of that he is something of a nuisance, especially if near a ranch-house or camp. For he does not discriminate in accumulating building materials and will carry off a monkey-wrench, a bottle, a bar of soap, a glove, as quickly as a stick of wood or an ear of corn. The kangaroo-rat, the chipmunk, and the various ground-squirrels are less meddlesome, and perhaps more edible, for the bob-cat likes them and the rattlesnake finds them acceptable diet. Everything hereabouts has something prowling on its trail and knows how to watch, listen, run, or fight with poison. The jack-rabbit and the cottontail set the pace in running, but even such small people as the lizards are excellent sprinters for short distances.

As for the poison-carriers, Mr. Dellenbaugh tells us there are nine kinds of rattlesnakes in this southwestern desert region, but in the immediate Canyon I have met with only two species—the diamond-back and the side-winder. The side-winder (so called because of his wriggling to the side in going forward) is the more common of the two, though he is not frequently met with. In color he is a dirty reddish brown, in size not large, in attack not very fierce. Of course he is poisonous enough if he happens to hit you, but usually he is rather sluggish in coming into action. A coral snake, so called, with

white rings about his body, is more venomous in look, but whether so in fact I cannot say. I have found them only on the Tonto platforms, where even the lizards are few and far between. In the Tusayan Forest the reptiles do not seem to flourish. Apparently they love the open better. But the visitor at the Canyon is not likely to meet them in either place.

The birds are everywhere—at sunrise in the Canyon perhaps, at noon or afternoon in the woods. There are not many of them in number or in species, though from day to day one meets with stray members of almost every family. The pine forest is not the best place in the world for the mocking-bird, the catbird, and the Western robin; but they, with the bluebird, the orchard oriole, the pewee, kingbird, thrush, grosbeak, flicker, turtle-dove, are frequently seen. They have no peculiar fitness for the Canyon or the forest, and perhaps just "happen" here. The cedar waxwing goes with the cedar or juniper berries, and one sees him along the Rim with his fellows in small flocks. He is less brilliant, is grayer in plumage, and not quite so large as the Eastern bird; but his appetite is just as keen and he is always interested in cedar berries.

The jays, both in numbers and in noise, monopolize attention in the open places of the forest and along the Rim. They are usually wrangling

and jangling with each other, probably over the supply of cedar berries or pine-nuts, both of which they eat. They are found in pairs, or in flocks of half a dozen, and from their penchant for the pinyons, they are known collectively as "pinyon jays." There are two varieties usually in evidence. One of them is similar, if not identical, with the Woodhouse jay. The plumage is dove-colored or grayish blue, with blue tail-feathers. Even more frequently seen is the beautiful crested jay. He makes much chatter in lieu of song. His crest in flight is flattened back upon his head, but as soon as he alights on a limb the crest is instantly elevated and he begins scolding, perhaps at a graceful, long-eared Kaibab squirrel or some lone porcupine lumbering along the trail.

The hairy woodpecker is not so abundant that one sees him every day, but other varieties are seen in quantities unlimited. The poor-will is oftener heard, in the night and early morning, than seen. He belongs to the night-hawk family, and when not in the air rests on the ground, with some of the instincts and a little of the color of the burrowing owl. His call is apparently an abbreviation of whip-poor-will. Its reiteration at night is monotonous, not to say irritating, to the sleepless camper.

The owls and the bats are usually down under the Rim. The Canyon walls, with their fissures and

caves, offer excellent harborage for them, and it is there that they pass their days, coming out in the early twilight to explore for food. In the daytime I have seen the small gray-green humming-bird go bustling into these cracks and openings, as though daring the inhabitants to mortal combat, but nothing came out save the humming-bird. He is the same quarrelsome little ball of feathers here as elsewhere. But he is not peculiar to the Canyon any more than the pretty horned larks that one sees down on the Tonto platforms, or the rock-wrens that one meets along the trails. There is a Canyon wren, very demure in gray and very inquisitive, that is supposed to be native to this place; but the specimens I have seen seem little different from the cactus-wren of the desert that builds a nest in the suhuaro or the cholla.

Of swallows there are several varieties, and all of them are very much at home along the Rim. One is a small telegraph-wire swallow that flies in narrow circles with a rather leisurely wing. At evening they gather in numbers on some point of rock extending out in the Canyon, and then, apparently by signal, they all plunge down the Canyon together, like small-boy bathers jumping from a raft. Another species flies on a strong, rapid wing, like that of the chimney-swallow. His swiftness is extraordinary. As you stand on the edge of the Rim

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PLATE 30. A TONTO PLATFORM.
False sage in foreground.

he dashes by your ear with a beat of wing that sounds like the quick crumpling of heavy paper. He plunges down into the Canyon for perhaps a thousand feet and then rises straight up toward the xenith, soaring and circling with supreme ease. His flight is remarkable and his dash over the Rim surprising in its disregard of abyss and precipice. Yet why should we be surprised? Why should a swallow look for danger in the air? Is not that his element?

These birds of the air, what a background the Canyon is for them! The golden eagle is at home here, making a nest on the ledge of some outstanding pinnacle—some huge rock spine cut off from the main wall—and there, secure from man and coyote, rearing the young. At dawn and sunset the pair go forth on air cruises. The flight is slow, more like that of a sea-gull than any other bird, and with little circling. But at times the male bird goes up in the storm-clouds, stands still like a box kite just ahead of the storm, and seems to defy the lightning. No vulture or buzzard ever goes so high or looks so speck-like against the blue. Most of the eagles seen by tourists are vultures. The mistake is natural, for the latter is the better flyer.

The brown-backed vulture, often seen circling easily under the Canyon walls, is the supreme embodiment of flight. Nothing could be more free,

more careless, and at the same time more certain. The stiff-set wings do not beat the air; they manipulate it, turn it, catch it, and bend it into service. Hour after hour, in all winds and in all directions, those stiff wings keep balancing and readjusting themselves to the wind, but do no initial propelling. Yet how that black spot wheels around an amphitheatre, glides across a canyon, soars up into the blue, drops like a bolt into the depths. He does no looping of loops or tail-spins, neither does he crumple up and fall to the earth with a crash. He does not move with a roar to be heard twenty miles down the Canyon; he slips along almost as silently as his black shadow under him. When within a few feet of him you can sometimes hear the cut of his flight feathers, like the slight whiz of an arrow, but that is all. He drifts through the air with apparently as little effort as thistle-down. How perfect the working of that flying-machine!

Wings and the will to fly! Sunlight and the world to roam in! Are we more fortunate, more perfect in development, more efficient in equipment? In desert lands the bird, the beast, and the plant are reared in adversity. Every tithe of energy is brought into use and the highest development is attained. The wings are trained to the thin air as the foot to the hard rock and the root to the shallow soil. They do not quarrel with the

conditions of life but accept them. They become a part of the environment, are in accord with Nature, and reflect her patience and her serenity. Are we as harmonious in our artificial environment? Are we?

CHAPTER XVI

THE CLIFF-DWELLER

Along the Rim, and back from it in the Tusayan Forest, one frequently sees at the present time mounds of scattered stones, with perhaps indications of old walls, or trenches now half-filled with earth, leaves, and pine-needles. Near them one may turn up bits of broken pottery, arrow-heads, stone hammers, old mealing-stones. Elsewhere about the forest or the Canyon there are found remains of the wickiup, the lean-to, and the hogan. These latter may be of recent origin, but the broken stone walls that once made up Indian forts, apparently belong to an earlier period.

There have been scattered Indian tribes around and about the Canyon from such time as the memory of man runneth not to the contrary. They were here when the Spaniards first came marching across the country in 1540 seeking "the seven cities of Cibola" and their supposed stores of gold. Small bands seem always to have lived along the Rim. Possibly they, or their immediate ancestors, were the ones who erected the stone forts as outposts and, later on, the wickiups and lean-tos as summer camps.

Perhaps at the same time with the outliers living along the Rim, there were other groups that lived down in the Canyon. The weaker ones—those of inferior numbers—probably sought out the Canyon for protection from enemies. It must have been a natural fortress if it were necessary to fight and a maze or labyrinth if it were necessary to hide. Predatory bands from the Painted Desert and beyond were probably beating across the Plateau Country, seeking out and robbing the weaker tribes, from the earliest days. There was always need to feint or fight.

But the few families that lived down in the Canyon could hardly grow in numbers. Circumstances were not favorable to such development. The Navahos, over on the Painted Desert, could spread out on their flat mesas and count their warriors by the thousands. They had not only agricultural lands but grazing country for herds of cattle and horses. But not so the Canyon Indians. They were only a handful, hemmed in by environing walls, with little water, and practically no land for cultivation. Their "gardens" were mere spots in a wilderness of rock, kept green by a chance spring of water; and their houses are supposed to have been merely the enclosed recesses under the cliffs —wind-worn pockets in the rock fortified by an entrance-wall.

Perhaps compelling conditions became modified after a period and some of the family units in the Canyon came together and began living in small cities on the Plateau, building community houses with thick stone walls, no doors, and ladder entrances by the roofs. Perhaps, again, the community groups, or pueblo Indians, and the Canyon dwellers were always separate and went their different ways, as their ancestors before them from the beginning. Theories are more easily established than right conclusions. The few Indians under the wall may have always been few. The Spaniards found large cities three or four days' journey afield, but the Canyon itself was practically tenantless.

The remains of these weaker bands, often referred to as the Cliff-Dwellers, are not very numerous or extensive. And this in spite of the fact that Powell found in the canyons through which he came isolated ruins of aboriginal houses, forts, sentry-posts, stairways cut in the stone, wooden ladders leading down over inaccessible heights, cisterns, mescal pits, gardens, pottery, pestles, baskets, mats. At Mille Crag Bend he found a three-story building of stone laid up with mud mortar, and farther on kivas or underground rooms for religious ceremonies. Elsewhere, outside of the Canyon, there have been discovered many genuine cliff-dwellings of the Plateau Indians in which, there can be no doubt,

From a photograph by F. A. Lathe, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 31. NAVAHO INDIAN AT RIM.

Pinyons right and left.

people lived at one time. Large communities dwelt in some of the wind-worn recesses, in the caves under cliffs, in the narrow canyons. In the Hovenweap district in Utah there are large round towers, extensive square rooms, walls of stone put up in adobe mortar that point to a high development;* and near Globe, Arizona, there have been recently discovered some very remarkable dwellings in a narrow canyon.

But in the Grand Canyon proper there is slight evidence for permanent cliff-dwelling. There are small gardens that were worked at one time, springs and trails and mescal pits, pictographs on rocks, and fire marks in caves; but there is a dearth of buildings or habitations of any sort. Even Indians require living space, with some measure of ground to cultivate and some flow of water for irrigation. They cannot subsist on the view. In the immediate Grand Canyon there is not sufficient land or water for a community of any size. Indian Garden, below El Tovar, was no doubt cultivated, and a few Indians lived there in the ancient days; but this is the one spot on the south side of the Grand Canyon where livable conditions are to be found.

There have always been more water, garden spaces, and Indian relics on the north than on the south side of the Grand Canyon; and farther away, some

* See *Journal of American Archeology*, December, 1918.

forty miles to the west of El Tovar by the Topocobya Trail, one comes to Havasupai (or Cataract) Canyon, where, three thousand feet down, a small tribe of Havasupais live at the present time. In this narrow canyon, with its fine blue water, some one hundred and fifty Indians manage to exist by growing corn, beans, melons, and other garden produce. Their dwellings are largely of hogan pattern, put together of brush and mud mortar. Some caves in the Canyon walls exist, but the Havasupais do not live in them except in time of flood, when driven out from below. They are not cliff-dwellers.

Now under the Rim of the Grand Canyon, sometimes several hundred feet down, on the protected ledges of the Kaibab, crowded in the wind-worn scoops of the wall, there are many so-called "cliff-dwellings" that are hardly such in fact. They are usually about three feet in width, four feet in height, and between four and six feet in length. They are made of loose rock put up as an outside wall, and, when completed, this was often chinked or plastered with a mud mortar. Frequently a doorway or entrance, about two or three feet square, was put in, and this was sometimes built with a wooden lintel fastened in the mortar.

Nearly all of these structures have been broken into, and nothing now remains of their one-time

contents. In examining dozens of them I never found any aboriginal relics except, in a single instance, a stone pestle and a flat mortar that might have been used for grinding corn. Out of one I got a rattlesnake, and out of another came a coyote and two cubs, but nothing that told the story of the builders or their purpose. They never were dwellings for the living, because too small for human habitation and too inaccessible for daily use. They are found on the most eerie ledges, and sometimes it is not possible to reach them save by a rope or ladder let down from above. They were perhaps designed for others than the living.

The placing of these rock enclosures on ledges and points difficult to reach, and usually hidden from the view of any one travelling along the Rim, suggests that they were possibly Indian graves. The size and form of them, the small door, and the sealing up with mud mortar all tend to confirm such an impression. The Indians of the Painted Desert in the ancient days were perhaps not always given to burning their dead; possibly they trailed up here to the Canyon to entomb their chiefs or head men—to hide them from foes and prevent sacrilege. There could not be found in Nature anywhere a more protected or a more appropriate place for burial. The Indian gods were supposed to dwell in the Canyon and watch over the dead.

Besides, walled in the rock, there was some chance of the body remaining intact until the Final Day. The Egyptians were not the only ones who hoped for the long-continued endurance of the body. Nor were the Indians the only ones to be disappointed of their hope. All graves sooner or later are despoiled and the dust within goes back to the dust without. The Tombs of the Kings in Biban el Meluk have become the parade-ground of tourists, and the possible grave of a Moki chief a whelping-place for coyotes! Nature forgets as well as man.

But it is more probable that these stone structures were depots or *caches* where corn and other dry grains were stored. The rock ledges offered protection from weather, and the mud mortar kept out the ground-squirrels and wood-rats. The necessity for hiding, or placing in accessible spots, would not be less with *caches* than with graves. The marauder or plunderer always has his wits about him in a semi-desert land like this Plateau Country. It is a difficult region to travel through because of the lack of food and water; and if the traveller, even to-day, would keep either the one or the other, he must resort to hiding.

Some confirmation of the *cache* theory comes from the older settlers at the Canyon, who have reported the finding of corn-cobs and dried maguey roots in

Photograph by W. F. Sesser, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 32. CANYON IN SNOW-STORM.

these enclosed rock pockets. Moreover, the Havasupais still use the caves in Havasupai Canyon to store dried vegetables and fruits. But there will probably always be some question about the Grand Canyon depositories because of their placing in such inaccessible positions. Several that I have surveyed, and tried to explore, seem impossible of reach save by long ladders. That might prove a defense against the itinerant marauder, but it would also prove somewhat bothersome to the cautious owner.

There are Indians that still come and go along the Rim, but their tribes have not increased. Saving the Navahos, they are no longer barbaric. Civilization has tamed them to a point of pauperism, and disease has wasted them. They are seen about the Canyon to-day only in odd groups that come in from Havasupai or the Painted Desert region to beg or barter. The old order has changed, giving place to a new that is no improvement so far as the Indian is concerned.

But the Indian at the Canyon was never more than a bat clinging to a caverned wall. The Pale Face is not very different from him at the present time. Eventually, no doubt, the latter will "civilize" the whole Plateau Country, but that will not add to the glory of the Canyon. The iron rail and the bridge will supersede the trail and the ford, and

perhaps many hotels will dull the memories of the *cache* and the wickiup, but we shall not profit thereby. Progress does not necessarily mean betterment.

CHAPTER XVII

THE DISCOVERY

EVERY one in the southwest knows that the first white people to come into the Plateau Country were the Spaniards. They came up from Mexico, led by Coronado, and are sometimes referred to as the "conquistadores." They were on conquest bent, and toiled across the southern wastes with a determination and an energy quite unparalleled. It was a desperate country through which to lead an expeditionary force. There was a dearth of food, forage, and, above all, of water. It was the desert —an *arida zona*, or, literally translated, an arid zone. Their name for the whole region has come down to us in contracted form, and is now the name of the State—Ari(da)zona.

The first of the Spanish contingent to arrive was the famous Franciscan brother Fray Marcos de Niza, who was accompanied by Stephen, a negro guide. They came up from Culiacan in 1539, and the priest at least was less interested in the quest of gold than the quest of souls. The negro guide went ahead of the padre, and arrived at Cibola (now identified with Zuñi), where he was taken

prisoner by the inhabitants. In attempting to escape he was killed. The padre saw Cibola only from a high distant hill, and when he returned to Mexico reported it as larger than the city of Mexico. Also the report was made that "on the portals of the principal houses there are many designs of turquoise stones, of which they have a great abundance; and the people in these cities are very well clothed."

It was the account given by Fray Marcos on his return that started the next year the celebrated expedition of Coronado and his ensign Tovar.* They were gold-seekers and on conquest bent, with little love for the Indian, though they carried the cross. But they were not lacking in courage. Every one who has followed the trail of the "conquistadores" has his profound admiration for their fortitude and endurance. Tovar and a detachment arrived at Cibola, and were met by the Indians there with presents of skins, corn-meal, nuts, birds, turquoises, cotton cloth. It was at Cibola that they heard of a large river lying "twenty days' journey" to the northwest, and when they returned to the main expedition, Cardenas and twelve men were detailed to ascertain the truth of the report. It was thus that Cardenas came to discover the Canyon.

* The hotel at the Canyon is named for him.

Casteñeda, in his Narrative of the Coronado expedition, tells the story of Cardenas:

"After they had gone twenty days they came to the banks of the river, which seemed to be more than three or four leagues above the stream which flowed between them. This country was elevated and full of low, twisted pines, very cold and lying open to the north, so that this being the warm season, no one could live there on account of the cold. They spent three days on this bank looking for a passage down to the river, which looked from above as though the water was six feet across, although the Indians said it was half a league wide. It was impossible to descend, for after these three days, Captain Melgosa and one Juan Galeras and another companion, who were the three lightest and most agile men, made an attempt to go down at the least difficult place, and went down until those who were above were unable to keep sight of them. They returned about four o'clock in the afternoon, not having succeeded in reaching the bottom on account of the great difficulties which they found, because what seemed to be easy from above was not so, but instead very hard and difficult. They said that they had been down about a third of the way, and that the river seemed very large from the place which they reached, and that from what they saw they thought the Indians had given the width cor-

rectly. Those who stayed above had estimated that some huge rocks on the sides of the cliffs seemed about as tall as a man, but those who went down swore that when they reached these rocks they were bigger than the great tower of Seville. They did not go farther up the river because they could not get water. Before this they had had to go a league or two inland every day, late in the evening, in order to find water, and the guides said that if they should go four days farther it would not be possible to go on because there was no water within three or four days. . . . This was the Tizon (Firebrand) River, much nearer its source than where Melchior Diaz and his company crossed it." *

This description fits the Grand Canyon, but it would also apply to the Marble Canyon, or perhaps to the Canyon of the Little Colorado. It is not possible to say just where the Cardenas party came out, but it is very likely that the Indians took them to the Grand Canyon, and to a spectacular part of it, such as Comanche Point or thereabouts. If the present Zuñi in New Mexico is the "Cibola" of the Spaniards, then it is difficult to explain the "twenty days' journey" to the Canyon. It could have been

* Casteñeda's Narrative is published in both Spanish and English in the *Thirteenth Annual Report of the Bureau of Ethnology*, Pt. I. Washington, 1892–1893.

From a photograph by F. A. Lathe, copyrighted by the Atchison, Topeka and Santa Fe Railroad.

PLATE 23. WHERE CARDENAS FIRST SAW THE CANYON.

Point a mile west Desert View. Colorado in middle distance. Painted Desert beyond to right.

reached from Zuñi in one-quarter of that time. But it is easier to imagine some error in the Narrative, or in its transmission, than to suppose the Cardenas party did not reach the Canyon. The Narrative calls the river the Tizon, which was the name given by Diaz to the Colorado below the Needles.

Before Diaz the lower river had been navigated by Alarcon, but he went no higher up than the Needles. The Canyon part was as impossible for boats then as now, and Alarcon never saw it. After Diaz there is a long silence. Perhaps the very existence of the Canyon had been forgotten when Fray Garcés, who had a mission below Tucson, at San Xavier del Bac, came up into the province of Tusayan, carrying the cross to the Indians. This was in 1776, and during that summer Garcés visited the Havasupais in Cataract (Havasupai) Canyon, probably going down there by the still-existent and somewhat perilous Wallapai Trail. After some days he came out and evidently travelled along the Rim of the Grand Canyon as far as the Little Colorado, which he crossed, and passed on to the Indian village of Oraibi. That village would not receive him, and he returned to the Canyon, and thus to his mission at San Xavier del Bac.

After Garcés there is another lapse of almost fifty years, during which there is little or no reliable

report about the Canyon. The next discovery of it was probably by American trappers, who were naturally less interested in the Canyon than in the River and what it would produce. They were after pelts, and the River supplied them with beaver. This commercial phase of discovery brought about the exploration of the canyons on the upper River, but probably not the Grand Canyon proper.

In 1824 General Ashley (a former Governor of Missouri) went into the fur trade with Andrew Henry, and established a camp in Green River Valley. Their expeditions by boat led them down the Colorado. Powell in 1869 found Ashley's name and date (1825) on a rock in Red Canyon. But the Ashley expedition ended in disappointment, if not in actual disaster, and was abandoned long before the Grand Canyon was reached. It is doubtful if any of the trappers—and there were many following or preceding Ashley—ever got as far as the Marble Canyon. There were too many rapids to run, too much danger and starvation on the way. They were not prepared for such a perilous expedition, and one by one gave up as provisions began to run short. In any event, they added little to Canyon history. Others of their kind—notably the Patties, father and son—had come up the Colorado from below, travelling probably along the edge of the Grand Canyon, but, again, adding little to

the record. They were trappers, adventurers, who came and passed on, carrying the tale of the Canyon marvel with them.

The expedition that followed after the trappers was governmental. Lieutenant Ives was sent by the War Department to explore the River above Yuma and find out whether it was a feasible way for carrying military supplies to the posts in New Mexico and Utah. He went up the stream in a steamboat, the *Explorer*, accompanied by twenty-four men and two artists—the latter making pictures of the route travelled. Ives went as far as Black Canyon, whither one Johnson had preceded him, and there his *Explorer* struck a rock. The boat was sent back to Fort Yuma, and Ives took a pack-train and went on to the Grand Canyon. He visited the Havasupais in Cataract Canyon, going down the Wallapai Trail, as Fray Garcés before him. Then he passed over to the San Francisco Mountains, crossed the Little Colorado, and visited the Mokis, again probably following the Garcés trail. He wrote a report of his trip that makes interesting reading.* It contains many pen pictures, for the Lieutenant was much impressed with the Canyon grandeur, and yet he thought it so remote and lonely that it would be "forever un-

*Ives, J. C., *Report Upon the Colorado River of the West*, pp. 13–131. Washington, 1861.

visited and undisturbed." Wherein he apparently failed to reckon with the American tourist.

In 1859 Captain Macomb was sent to examine the junction of the Green and Grand Rivers. Doctor Newberry, who had been with Ives, accompanied Macomb. Nothing of importance relating to the Grand Canyon portion of the stream came out of it. At the end of the Civil War miners found their way into the lower Canyon, but neither did any report of value come from them. Dellenbaugh tells the tale of these various expeditions as leading up to the real exploration of the River, which was undertaken by Major Powell in 1869. Dellenbaugh's story* is more than interesting because he accompanied Powell on his second expedition in 1871–1872, and he speaks with knowledge and authority.

Powell's expeditions were those of an explorer-scientist. It would be difficult to say which was the greater in him, the spirit of the adventurer or the curiosity of the geologist. Apparently the tales told of Canyon dangers spurred him on. The Indians had given out stories of canoe parties that went down the Colorado and were overwhelmed by the waters, of underground passages where the great stream disappeared for hundreds of miles, and of high enclosing walls that only the eagles

* Dellenbaugh, F. S., *A Canyon Voyage*. New York, 1908. *The Romance of the Colorado River*. New York, 1909.

KAIBAB
COLORADO RIVER
Kanab Creek
Jumpets Creek
Spring Creek
LOWER GRANITE GORGE
POWELL PLATEAU
Rose Pt.
Beale Pt.
Ives Pt.
Wheeler Pt.
Dutton Pt.
Violet Pt.
Muav Canyon
King Crest
Masonic Temple
Holy Grail Temple
Tower Terrace
Duvan Terrace
Shinumo Creek
GRANITE GORGE
Dox Castle
Marcos Terrace
Copper Canyon
Mt. Huethawali
BASS TRAIL
TONTO TRAIL
HAVASUPAI INDIAN RESERVATION
Havasupai Village
Cataract Creek
INDIAN VILLAGE TRAIL
Apache Pt.
Chemehuevi Pt.
BASS CAMP
Tonto Pt.
Havasupai Pt.
Pt. Quetzal
AZTEC AMPHITHEATER
Montezuma Pt.
Pt. Huitzil
Pt. Centeotl
COCONINO PLATEAU
Waldapai Pt.
Turquoise Canyon
Castor Temple
Pollux Temple
Pulpit Pt.
Vicarilla Pt.
Mescalero Pt.
Minotaur Pt.
TO ASH FORK
THE
GRAND CANYON
NATIONAL PARK
ARIZONA
Scale
0 ½ 1 2 3 4 5 6 7 8 MILES
Boundary of Park
Wagon Road
Automobile Road
Main Trails
Other Trails
Railroad
GRAND CANYON
MARBLE CANYON
Colorado River
Grand Canyon
Colorado R.
Williams
San Francisco Peaks
Ash Fork
Flagstaff

PLATE 34. GRA

could surmount. They warned Powell against entering the gorge. It was contempt of the gods. But nothing stopped him. From Green River City in Wyoming he drove through in boats for a thousand miles to the mouth of the River Virgin, beyond the Grand Canyon. On his second expedition in 1871 he went as far as Kanab Canyon. These were the first scientific explorations of the canyons by way of the River. The account should be read in the original and not in a paraphrase.*

After Powell's day a number of expeditions were fitted out from time to time with the avowed intention of "going through the Canyon." The feat had been heralded as "dangerous," "difficult," "impossible," and that advertisement naturally drew the attention of some who were disposed to run risks in accepting dares. In 1889 Frank M. Brown, surveying for a railway along the River, led a party as far as the Marble Canyon, where he lost his life in running a rapid. Robert Stanton, who had been with Brown, got through to the Gulf of California the next year. In 1897 a trapper named Gilloway went through as far as the Needles. Since then several expeditions, notably one of the Kolb brothers, who made moving pictures of their voyage, have been undertaken with more or less success. At the

* Powell, J. W., *Exploration of the Colorado River of the West*. Washington, 1875.

present time the Canyon region is fairly well known both topographically and geologically. The trip by boat is still dangerous, and adventurous people no doubt will continue to make it, but so far as science or exploration is concerned the risk is neither necessary nor worth while.

The conquistadores, the padres, the trappers, the explorers, the geologists, having had their day and said their accustomed say, who should come upon the scene but the artist and the writer, with their whilom auditor and follower, the tourist. Its uselessness in commerce or agriculture having been for the moment demonstrated, the Canyon has been hailed as a thing of beauty, and both the brush and the pen have been called into service to picture it. The first of the brushmen, Eggloffstein and Mollhausen, were with Ives, and their truth of representation has been called into question. They were obsessed with the Düsseldorf way of presenting a picture pattern, and rather conventionalized or Germanized the Canyon. After them came W. H. Holmes, who did the wonderfully accurate and detailed plates that accompany Dutton's report.* The Holmes pictures are admirable illustrations and deserve great praise for their topographical truth. They are in a class with Audubon's *Birds*

* Dutton, C. E., *Tertiary History of the Grand Canyon District*. Washington, 1882.

of America and possess the same excellences of characterization.

Holmes had been preceded in topographical and spectacular landscape by F. E. Church, who as early as 1853 went to South America and sketched the Andes, afterward becoming famous for such pictures as the "Heart of the Andes." After Church came Albert Bierstadt, who in 1858 made his first sketching-tour in the Rocky Mountains, accompanying General Lander's overland expedition to establish a wagon-trail to the Pacific. Bierstadt later on painted the Yellowstone, the Yosemite, and other Western scenes, achieving a great reputation thereby. Thomas Moran was also brought under the spell of Western landscape as early as 1871, when he accompanied a government expedition to the Yellowstone region. In 1874 he began painting the Grand Canyon of the Colorado, and since then he has done many famous pictures of "the great chasm," as it was formerly called.

Moran's name is associated with the Grand Canyon, as Bierstadt's with the Yosemite, and Church's with the Andes. They all painted the panoramic and the spectacular, and they all attained a truth of scale and perspective more or less monumental and impressive. Moran was perhaps the best painter of the three; but even in his work there is the feeling of the merely "mappy" and the

topographic that rather crowds out the æsthetic and the pictorial. In all of these pictures or "views" the form becomes too dominant for anything like sensuous seeing. In fact, the panoramic is a *genre* of its own—something exceptionally obdurate in art.

Scores of painters have had a try at the Canyon since Moran first blazed the road, but, as a whole, they have not greatly improved upon him. Only of recent years have they taken up the problem in an interpretative way. The modern tendency in dealing with it is to follow up suggestion rather than realization. Impressionism, in its rightful meaning of giving the realistic or objective impression of the fact, is possibly the better method of procedure. It is doubtful if sentiment or emotion, or a too subjective treatment of any kind, can avail much with such colossal forms and colors as the Canyon presents. The purely decorative treatment fares no better. You cannot turn the Canyon into a tone of color, or arrange it as a merely graceful pattern of form, without distorting truth and falling into insipidity. Indeed, there are many difficulties in the way of the individual who would put the Canyon on canvas. More than one painter has come to grief over it.

Just so with the poets. The bookman fares no better than the brushman. Many a poet has come

away from the Canyon with a fine frenzy in his eye and a thick feeling in his throat, but by the time he has his emotion down on paper it has proved merely a disjointed rhapsody. You cannot absorb the Canyon mentally and body it forth in verse as you do the New England mill-pond or the poppies in Flanders fields. The mass of form and color, the bewildering display of light, are baffling. For all the verseful eulogies and rhythmic odes, the beauty of the depth remains unrevealed, its splendor not half told. The Canyon still lacks a poet.

Even the people who write prose, and are not popularly supposed to be bothered with fine frenzies, have their troubles in describing the Canyon. They have not enough adjectives to go around or to reach up and over. Language fails them. The tourist who comes out to the Rim for the first time and exclaims "Good God!" comes as near description as the more elaborately wordy if by his exclamation he means not only his own surprise but the greatness and goodness of God. One can, of course, particularize, and grow wearisome in doing so, without reaching expression. Every writer dreads falling into that slough. And, in any event, in the final analysis he must realize that, with the Canyon for a theme, he has not reached up high enough. His difficulties are those of the early explorers. The Canyon is practically impossible.

The great chasm cannot be successfully exploited commercially or artistically. It cannot be ploughed or plotted or poetized or painted. It is too big for us to do more than creep along the Rim and wonder over it. Perhaps that is not cause for lamentation. Some things should be beyond us—aspired to but never attained. The great goddess Nature, standing here in her majestic splendor, may be seen, admired, and loved. What more would we? Why should we wish to jostle her familiarly or even so much as touch the hem of her golden garmenting? Wrapped in her purple mists and under her blue immensity of sky, she should rest forever aloof and inviolate. The mystery that surrounds her should remain a mystery.

As for our wonder, it is a natural inheritance. We opened our eyes upon the world with awe and we close them at the last groping our way in starry spaces. May it never cease! With definite knowledge one abandons interest. The world becomes commonplace.